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VETERINARY MEDICINE

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CONTENTS

Veterinary Progress, Policies and Comment 441-448

The 1943 American Lamb Crop, 441; Protein Extracted from Pasture Grass, 441; Sulfathiazole for Trench Mouth, 441; Boston Certified Milk to Be Pasteurized, 441; Cadaver Nerves Used for Grafting, 441; Preservation of Whole Milk Powder, 441; Artificial Dairy Cattle Breeding Association Formed, 442; Program for Control of Mastitis Inaugurated in Delaware, 442; Screw Fly More Abundant, 442; Killing Trichinae in Garbage by Cooking, 442; Many Preventive Vaccines Used for Armed Forces, 442; Clinical Report on Penicillin, 443; Distribution of Calcium in the Body, 443; Protein from Corn Germ, 443; United States Live Stock Sanitary Association Meeting, 444; Comparison of Rail and Truck Casualties, 444; Tentative Statement of Policy for Feed and Live Stock, 444; Beef Livers Condemned, 445; An Improved Sheep, 445; Meat Use Increasing, 445; Eastern Iowa Veterinary Association, 446; Doctor Mohler Honored by American Meat Institute, 448; Achromotrichia in Animals, 448; Do Not Kill Ailing Animals, 448.

Management and Healing of Wounds 449

Problems in Swine Practice 460

Canine Distemper 466

Feeding Turkeys 470

Animal Husbandry in India 473

Facts Regarding Goats 476

***Glottidium vesicarium* in the Southwest** 778

Autobiography of a Veterinary Practitioner 480

Case Reports ..... 485 to 494

Atypical Purpura Hemorrhagica in a Six-Year-Old Gray Mare, 485; Cesarean Section with Complications of Traumatic Gastritis, 486; Cutaneous Hemorrhage in a Mule, 487; Mildew Poisoning in Sheep, 487; Sporadic Occurrence of Blackleg, 489; Worms in Genital Organs of Colt, 490; Boar Restrained for Castration, 490; Persistent Foramen Ovale in Foal, 491; Inguinal Hernia in Bitch, 492; Puncture Wound in Thigh of Horse, 492; Lymphocytosis in Cow, 493; Treatment of Dry Eczema in Dogs, 494.

Abstracts 495-496

Ophthalmia in Dogs Due to Riboflavin Deficiency, 495; Beef Blood as a Substitute for Human Blood, 496; Treatment for Sarcoptic Mange, 496.

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7833 S. Cranden Ave.
Chicago 49, U. S. A.

U. S. D. A. Photograph by Forsythe

Undebatable evidence that calfhood vaccination is the keystone to successful control of bovine brucellosis is reflected by production of 14,153,037 cc. of Strain 19 Brucella Abortus Vaccine in federally licensed laboratories during the fiscal year ending June 30, 1943, according to *Service and Regulatory Announcements* of the U. S. Bureau of Animal Industry, August, 1943.

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D. M. CAMPBELL, *Editor*
7632 S. Crandon Ave., Chicago, 49, Ill.
Telephone South Shore 7160

H. J. MOSTYN, *Eastern Representative*
1265 Broadway, New York, 1, N. Y.
Telephone Murray Hill 4-4037

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The American lamb crop for 1943 is approximately 31,000,000 head, a decrease of 1,500,000 from 1942 due to fewer breeding ewes and a smaller percentage of survival of lambs dropped.—*S. N. L.*

Experiments are being conducted at the U. S. Regional Pasture Research Laboratories at State College, Pa., by which protein concentrates are extracted from grass. Where little of available grass has been used for forage, it would add considerably to our much needed supply of protein, should those of the otherwise waste grass be extracted and made available.

That sulfathiazole may be a specific for trench mouth and the sore throat that often goes with it, is suggested by Major C. S. Linton.[1] It was thought advisable "to make a preliminary report showing remarkable recovery under treatment with sulfathiazole" because the disease is likely to increase under war conditions. Patients were given sulfathiazole tablets to dissolve on the tongue every two hours during the day and every four hours at night. However, those used at night were double strength. Usually in two days the medication was discontinued because the symptoms had disappeared.

[1] *Jnl. A. M. A.*, 1943, 123:6.

As of October 1, 1943, a regulation of the Boston Health Department requires that no raw certified milk may be sold in Boston. This order became effective 15 days after the publication in VETERINARY MEDICINE of an item in which Boston was credited with having 70% of its certified milk pasteurized.

The first clinical use of cadaver nerves to graft together severed nerves has been reported by Dr. R. M. Klemme, Capt. R. D. Wooley and Dr. N. R. deRezende.[1] Acacia glue instead of sutures was used to join the severed ends of the nerve. It is thought that the role played by the glue is merely to hold the graft together and that the cadaver graft acts as a framework of tubes for ingrowth of the severed axons nerve fibers.

Research laboratories of MacDonald College, Quebec, find that whole milk powder remains fresh twice as long if minute amounts of wheat germ oil combined with edible hydroxy acids are homogenized in a small quantity of skimmilk and then poured into the liquid whole milk to be dried.

Since the production in the United States of dried milk is expected to reach 150 million pounds in 1943, the keeping qualities of the product are of great importance.

[1] *Jnl. A. M. A.*, 1943, 123:7.

In an organization just completed of the Jones County (Iowa) Artificial Dairy Cattle Breeding association, 700 cows are listed. The group then began operations in affiliation with the Linn County Association. Dr. J. W. Pirie, Cedar Rapids, is the veterinarian in charge.

Delaware Inaugurates Program for Control of Mastitis

A program for the control of mastitis in Delaware has been inaugurated with Dr. Vaughan C. Lancaster, U. P. '37, a practitioner from New Castle as mastitis expert in charge. The State Board of Agriculture in cooperation with the Agricultural Experiment Station and Haskell Research at the University of Delaware are sponsors of the project which will be based upon the mastitis research conducted by the Haskell Foundation. A diagnostic laboratory has been established for the control work at the University. Doctor Lancaster will divide his time between work at the laboratory and in the field contacting dairymen and their veterinarians in an endeavor to establish a well coordinated program of control in which the technical skill of the practicing veterinarians will be fully utilized.

Screwworm Fly More Abundant

Weather conditions in the southern part of the United States have favored the overwintering of the screwworm fly, *Cochliomyia americana,* entomologists of the United States Department of Agriculture have found.

Climatic conditions have, in fact, been more favorable generally over the whole country for the survival and spread of this fly than at any time during the past 25 years.

Livestock growers, county agents and others have been advised by department scouts to use Smear 62, the most effective treatment for infested animals.

Stockmen again should be warned to guard against wound infestations in livestock from October 1 through January 31 by reducing the number of surgical operations and treating promptly all infested wounds.

Approximately one-half of all meat consumed by our armed forces is beef.

VAUGHAN C. LANCASTER
Selected to direct the mastitis control program planned for Delaware

Wright and Bozicevich,[1] in experiments as to the minimal time required for cooking garbage to destroy trichinae, have concluded that the larvae will be destroyed if the garbage is cooked for 30 minutes in an open container—this applies to pieces of pork up to three inches in thickness and, if the garbage is allowed to cool gradually, it would probably be effective in even larger pieces.

The armed forces use preventive vaccines against seven key diseases: typhoid, smallpox, tetanus, typhus, yellow fever, cholera and plague. In this war there have been no cases of yellow fever in either the army or the navy and only a scattering of reports among the other diseases—including one navy case of plague. Deaths among this group of diseases were negligible. The army reported about 60 cases of typhoid, but very few deaths, in 1942, and the navy eight cases with one death in the same period.—*O.W.I.*

[1] Wright, W. H. and J. Bozicevich, 1943. Experiments in cooking garbage for destruction of trichinae in pork scraps. *Public Health Reports,* 58, p. 396.

Clinical Report on Penicillin

Penicillin is a remarkably potent antibacterial agent which can be given by injection into a vein, into a muscle or by local application but it is ineffective when given by mouth, the Committee on Chemotherapeutic and Other Agents, of the Division of Medical Sciences, National Research Council, declares in *The Journal of the American Medical Association* for August 28 in a statement outlining the findings from a study of 500 cases of infection treated with the substance.

Other conclusions reported by the committee are that following intravenous or intramuscular injection penicillin is excreted rapidly in the urine, so that in order to obtain an adequate amount of potent material in the circulating blood and tissues it is necessary to inject penicillin continuously or at frequent intervals; that is, every three to four hours.

Penicillin has been found to be most effective in the treatment of staphylococcic, gonococcic, pneumococcic and hemolytic streptococcus infections. It has been disappointing in the treatment of bacterial endocarditis. Of 55 patients with osteomyelitis 48 recovered or improved and seven showed no effect. However, it is pointed out by the committee that final statements concerning the ultimate outcome of these cases cannot be made until several years have passed.

Patients with pneumococcic pneumonia frequently recover following the use of 100,000 units given over a period of three days. This is especially important in sulfonamide resistant pneumococcic infections.

Of 129 cases the effect of penicillin was particularly striking in sulfonamide resistant gonococcic infections. One hundred and twenty-five were free from symptoms and were bacteriologically negative within nine to forty-eight hours after treatment. These findings lead the committee to declare that "Here, then, is a most potent weapon in the treatment of sulfonamide resistant gonorrhea, and it is not too much to predict that penicillin will prove to be one of the most effective agents in the treatment of a disease that causes great ineffectiveness in the armed forces and in the civilian population."

* * * *

Calcium constitutes a larger portion of body weight than does any other of the mineral elements. It is very unevenly distributed in the body, over 99% of the total amount normally being in the skeletal system.

* * * *

Protein from Corn Germ

With meat shortages making every one increasingly protein-conscious, news that half-billion pounds of good protein a year may be made available for human consumption comes from the chemical laboratories of the University of Illinois. It is corn protein, in the germ or unsprouted plant tucked in the corn grain, which is at present used principally as animal feed because of the tendency of corn germ to turn rancid quickly.

A new kind of "de-fatted" corn germ, with this oil extracted and saved, has been put through a series of tests on laboratory animals by Dr. H. H. Mitchell at the university, who has now made a preliminary report to the National Research Council in Washington, D. C. In it he states that "except for the cashew nut, defatted corn germ is the only plant food we have studied, the protein of which possesses as high a biological value as lean meat."

The fat content is reduced to 2%, moisture to 8%, so that the keeping qualities of the defatted germ have been greatly improved. When the corn germ was found to be palatable to human beings, the University of Illinois began checking the nutritional values of this new food, hopeful of increasing the value of the corn crop.

Dr. Mitchell's feeding experiments showed that defatted corn germ contains 21% protein, which is 85% as digestible as beef protein and with a biological value quite as high. It is also rich in several vitamins and has a high mineral content. Its iron content assays at the exceptional figure of 300 parts per million.—*Science.*

★ ★ ★ BUY WAR ★ ★ ★
STAMPS AND BONDS

W. H. HENDRICKS

When the 47th annual meeting of the United States Live Stock Sanitary Association convenes in Chicago December 1-2, it will be called to order by the new president, Doctor Hendricks, who is also State Veterinarian of Utah

Comparison of Rail and Truck Casualties in Proportion to Number Hauled*

Twice the dead cattle by truck as by rail
One-fourth more dead calves by truck as by rail
Twice the dead hogs by truck as by rail
Twice the dead sheep by truck as by rail
Three times the crippled cattle by truck as by rail
One-fourth more crippled calves by rail as by truck
One-fifth more crippled hogs by rail as by truck
One-third more crippled sheep by rail as by truck

Until 1942 there had been a substantial decrease in deads and cripples both by rail and truck since 1936 and for the first seven months of 1942 compared with same period in 1941. But the last five months of 1942, however, show a big increase, especially in deads.

There was a 20% increase in deads for the year compared with 1941, but all increases occurred in the last five months of the year as shown in the following table:

*Report, 1942, *Live Stock Loss Prevention Board.*

TREND IN RAIL DEADS
1942 COMPARED WITH 1941

1st 7 months:		Last 5 months:	
Cattle	1% decrease	Cattle	38% increase
Calves	20% decrease	Calves	40% increase
Hogs	16% decrease	Hogs	33% increase
Sheep	3% decrease	Sheep	35% increase

Why such increases in deads for all classes of livestock when the war effort is for less waste?

R. A. HENDERSHOTT

As secretary-treasurer of the United States Live Stock Sanitary Association, Doctor Hendershott, Chief of the B. A. I. of New Jersey, succeeds Mark Welsh, who has capably filled that position for several years

Tentative Statement of Policy for Feed and Livestock

The total supply of concentrate feed for the year beginning October 1, 1943, after allowing for minimum carryovers a year later, will be about 5% less than the quantity actually fed last year. The quantity of feed grains available for feeding, beginning October 1, 1943, is expected to be between 5 and 10% less than the quantity fed during the past 12 months and the quantity of wheat may also be slightly less. The total supply of protein meals and other high protein feeds should be 3 to 5% more.

On the other hand, the matter of live stock and poultry on farms January 1, 1944, will be about 10% larger. Therefore, in order to maintain the largest practical balanced production of live stock and poultry, our prospective feed supplies will have to be distributed and utilized with a great deal more care than usual.

To bring our animal population and our feed supplies in balance, hogs will need to be marketed at average weights rather than at the heavy weights of the past two years; more dependence will need to be placed on roughage for cattle and sheep; shorter and lighter feeding of beef cattle is desirable; heavier culling of poultry flocks, and all-round better care and management of our live stock and poultry are important factors. Furthermore, it is necessary, because of feed supplies, to level off hog farrowings and broilers raised in 1944 at about the 1942 levels.—*War Food Administration.*

During 1942 there were 1,230,000 beef livers condemned for all causes under B.A.I. inspection—a waste of 15,375,000 pounds of valuable meat. When to this is added that condemned under state and city inspection there was a total waste of 19,000,000 pounds —equivalent to 1,520,000 livers which at $3 each would make a total cash loss from livers alone of $4,560,000. Of these livers 50% were condemned for abscesses.—Report (1942) *Nat'l Livestock Loss Prevention Board.*

"Southdale," an Improved Sheep Type

The Southdale, a new crossbred type, which combines the desirable characteristics of the Southdown and of the Corriedale breeds of sheep, is being developed by the U. S. Department of Agriculture at its farm near Middlebury, Vt.

Plans for the new model, designed especially to meet New England conditions, call for "fixing" in it genetically the desirable mutton qualities of the Southdown and the wool qualities of the Corriedale. The aim of the government's geneticists and sheep specialists has been to produce the new type of moderate size and good constitutional vigor.

Up to the fourth-generation, Southdales have so far performed satisfactorily. The lamb crop last year was 130 lambs per 100 ewes and the average weight of the fleeces sheared from the ewes, including yearlings, was 7.3 pounds. Continued selective breeding is resulting in a reasonably uniform type of animal.

Cause of Yellow Beef Fat

Experiments conducted by the University of Illinois show that the yellow color of the fat of pasture-fed beef is acquired principally in the spring and early summer when the grass is greenest and highest in carotene content. Full-fed cattle should not be turned on pasture, unless they are to be fed beyond midsummer, if white fat is desired.

That the drinking of one pint of 32% cream causes human blood serum to become injurious to the red cells of the blood, making them more fragile and more easily destroyed, is announced by research scientists of the University of Chicago. However, the blood destruction resulting from imbibing large amounts of cream or fats does not produce anemia in persons in normal health. A question arises as to whether the building of new red cells after blood loss through hemorrhage might be hastened by a low fat diet or retarded by a high fat diet?

Use of Meat Increasing

The annual per capita consumption of meat in the United States in recent years is shown in the following table:

1935	116	pounds (all-time low)
1938	127.2	"
1939	133.6	"
1940	142.0	"
1941	143.9	"
1942	146.5	"

The foregoing statistics were released by the Food Distribution Administration, U. S. Department of Agriculture.

More Sheepskins

Tanners engaged in filling Army Air Corps orders for pelts were able to buy, during the period January 1 to October 1, a total of 3,800,000 skins. This was an increase of 1,200,000 skins over the total production of pelts in 1941, and these were obtained during the first nine months of the year. This would indicate a production of over 4,000,000 pelts during the calendar year 1942. This figure does not include a half-million shearling skins produced by shearing pelts with the wool on.—*Farm Credit Administration.*

The Eastern Iowa Veterinary Association

With a considerably larger attendance than at the meeting of the previous year, the Eastern Iowa Veterinary Association met at Cedar Rapids October 12-13 with President C. L. Moles presiding. The program was replete with papers of paramount importance under war conditions. Lively discussions followed many of the presentations.

Approximately 120 women were present and much enthusiasm was manifested over the talk "Britain at War" given by a commentator of Station W M T, Cedar Rapids, the afternoon of the 13th.

The most unusual feature of the banquet (even taking into consideration that Iowa corn-fed beef was served) was an interview, conducted by Cliff Carpenter, the toastmaster, with Staff Sgt. Tommy Gibbs of Toledo. Although only 19 years of age this soldier as waist gunner had taken part in 35 bombing missions over various combat areas, including the Roumanian oil fields and Rome. When J. I. Gibson sang his "Milking Song," which seems to have superseded the "Tall Corn" song, there was no question about it being a banquet of the Eastern Iowa Veterinary Association.

A few highlights of the program follow:

Encephalomyelitis

There were 333 cases of encephalomyelitis with 86 deaths in unvaccinated horses in 1943. There were four cases (as much as 10 days later) in vaccinated animals and, although 35,835 horses were immunized by veterinarians for the Western type in 1943, there have as yet been no deaths of any of these vaccinated animals. A total of 1105 reports were sent in by 496 Iowa veterinarians. These practitioners are urged to keep sending in such reports and also to be on the lookout for the St. Louis and Eastern type of encephalomyelitis because such cases require a different virus for immunization.—*J. A. Barger,* Veterinarian, B.A.I.

Anthrax

A late summer outbreak of anthrax occurred in Marshall County on pasture which had been previously overflowed. Seven cows died on one farm and losses resulted on six other farms. All sudden deaths should be questioned—look out for anthrax, notice bloating and bloody discharges from body openings. A good specimen for laboratory diagnosis may be secured by tying off a portion of the jugular vein containing blood. —*C. C. Franks,* Iowa State Veterinarian.

Poultry

In poultry husbandry 80% of prevention of death in a flock is attributable to proper management and not medicine. There are 5½ million farms with flocks of around 200 birds which have produced 60 billion eggs. There are about 130 thousand large commercial flocks. About 11 million pounds of hogs had to be rendered last year as a result of infection with avian tuberculosis. Don't let chickens and hogs run together. About the world's best litter (crushed corn cobs) is burned as fuel in Iowa, while straw, about the world's poorest litter is being used. Don't tolerate rats in the poultry house—three rats use as much food each year as two of the best laying hens. Pretty expensive! Remove stones or boards lying about the poultry premises as anything that holds moisture in the ground encourages insects which are carriers or reservoirs of the tapeworm. A charge should always be made for an autopsy on poultry.—*Cliff Carpenter,* Sec. National Poultry Advisory Council.

Sulfa Drugs

Irritating alkaline salts of some of the sulfonamides sometimes set up inflamation and even cause lesions. Clean wounds of pus and tissue débris but little other débridement before topical application of sulfonamides. Horse infections are mostly streptococcic and call for sulfanilamide. In dogs it is about 50-50 of streptococci and staphylococci and sulfadiazine is useful. Sulfasuxidine challenges sulfaguanidine as a slow absorbing drug.—*R. F. Bourne,* Colorado State College.

Mastitis

In the control and treatment of bovine mastitis (1) eliminate affected cows from the herd (2) heed sanitation (3) use bacterin, vaccine and lacto-vaccine to increase immunity in non-affected cows (4) use intra-mammary antiseptics—dyes, trypaflavines, acriflavines, etc.—*R. C. Hawk.* Practitioner.

Sheep Parasites

In treating sheep for parasites if a small amount of copper sulfate is used it has an effect on the taste bulbs and closes the esophageal groove and allows phenothiazine to go down easily past the rumen into the stomach. There is not much difference whether phenothiazine and salt are used in proportion of 1:9 or 1:15. The mixture should be used for four days and repeated in 10 days if needed but no salt should be given between times. If the treatment is continued without interruption it will cause anemia. Since phenothiazine discolors the fleece it is not advocated for show stock.—*H. C. Smith,* Oklahoma, A. & M. College.

Swine Erysipelas

Acute infectious enteritis or suipestifer infection is the most difficult disease to differentiate from acute erysipelas of swine. It is an advantage to know the age of the hogs affected because ordinarily infectious enteritis attacks young pigs shortly after weaning. When death occurs from suipestifer infection the abdomen may be blue or purple but in death from acute erysipelas if the skin on the abdomen is affected it will always be a scarlet-red color. Scouring usually occurs in infections of hog cholera and infectious enteritis but not in acute erysipelas.

To control erysipelas on a farm by the serum and live culture method, treatment should begin with the baby pigs and the sows but not unless the disease was prevalent the year before on that farm or in the neighborhood. The earlier the pigs receive the culture and serum the better. Young pigs should be given ¼cc of culture and 5cc of serum and the adult animals up to 1cc of culture and 20cc of serum. More than 3,000,000 hogs (30,000 droves), have been vaccinated by this method with generally satisfactory results. Where the chronic form of the disease exists and there are many unthrifty pigs, vaccination with serum and culture often is helpful, but it must be borne in mind that damage beyond repair may already have taken place.—*J. E. Peterman,* B.A.I., Nebr.

WAVES

Daughters of Grant B. Munger, well-known veterinarian of Cedar Rapids—always present at the Eastern Iowa meeting. Right, Dorothy, S.K. 3/C, U. S. Naval Air Station, Glenview, Ill. Left, Maurene, Y. 3/C, U. S. Naval Air Station, Atlanta, Ga. Both waves are graduates of University of Iowa, Delta Gamma and Junior League members

Swine Dysentery

Dysentery manifests itself in swine by diarrhea characterized by the presence of mucus and also, quite often, by blood and large quantities of foul discharge in just a short while. Dehydration is usually present. Although there is no marked depression and the appetite remains good, the flanks cave in rapidly when the animal becomes dehydrated. The morbidity depends upon age—in the young 100% are infected and 75 to 80% die. In older hogs there is much less death loss—the average deaths of all ages is around 25%. The location of the lesions of dysentery is in the cecum and the colon. There is not much deep necrosis of the wall but there is marked destruction of the epithelium of the cecum. The disease spreads only through the bowel discharge and that rapidly.—*L. P. Doyle,* Purdue University.

New Officers

Officers for the ensuing years are: R. E. Elson, Vinton, President; C. B. Strain, Dunkerton, Vice-president; C. C. Graham, Wellsburg, Secretary; A. K. Menary, Cedar Rapids, Treasurer and Jack Jensen, Trustee.

In Appreciation of a Noted Veterinarian

The following inscription was etched on the humidor presented *in absentia* to John R. Mohler on the occasion of the annual meeting of the American Meat Institute, by Thomas E. Wilson, first president of the Institute:

"To Dr. John R. Mohler: The meat industry salutes an illustrious scientist and an efficient administrator; one who has dedicated a major portion of his life to unselfish devotion to the eradication of disease among livestock and the promotion of public health. May your retirement be as full of happiness as the good you extended in service.—Adopted by resolution of the board of directors of the American Meat Institute, October, 1943."

To quote from the speech of presentation: "Doctor Mohler has been a great man for the livestock industry. He has protected and helped the production of livestock and has always been on the watch to aid the control of diseases of any kind."

Courtesy National Provisioner

Achromotrichia in Man and Animals

Incidental to vitamin B complex research it was noted that deprivation of pantothenic acid led to graying of the coat in rats and that supplying this vitamin in abundance to such rats later brought about a restoration of the normal color.

At once extravagant claims were made by nostrum vendors for preparations containing this vitamin as a preventive and restorative for graying hair, in persons of all ages. These claims were not supported by the use of the product. Recently reports of scientific tests are becoming available. They indicate that biologically men are not rats and they who would camouflage the flight of the years must still as heretofore rely upon dyes and be resigned to presenting an odd appearance.

The newest of these scientific reports is of a trial of calcium pantothenate and para-amino-benzoic acid on 19 elderly persons with gray or graying hair. The drugs were administered daily for eight months. While a yellow or greenish cast developed in most of the subjects, unequivocal change in color occurred in only two. In both of these the change tended toward the original color.

The conclusion reached by the researchers was: "Much of the publicity concerning anti-gray hair factors has left a distorted impression with regard to the ability of compounds to restore the original color to gray hair in man."

Merge Departments of the B. A. I.

The Animal Disease Station at the Beltsville Research Center and the Pathological Division of the Bureau of Animal Industry have been combined with Harry W. Schoening as chief. Adolph Eichhorn, recently retired, was director of the center for many years.

The new arrangement is expected to coordinate more closely the disease-control investigations of the two groups. The work will be along the same lines as previously carried on by both. Diseases under investigation are encephalomyelitis, infectious anemia, brucellosis, anaplasmosis, tuberculosis, mastitis, hog cholera, swine erysipelas and poultry diseases.

The Management and Healing of Wounds

By JOHN A. UTTERBACK, Captain, V.C.

Edgewood Arsenal, Maryland

THE etiology of pathological conditions was probably first observed by prehistoric man in wounds inflicted by his self-styled club and the saber-like tooth of the tiger. The management and success in reduction of mortality from wounds entails more than passing attention. The early writers on surgery, Hippocrates, Celsus and Paré did not emphasize the importance of infection in wounds. During the Eighteenth Century serious infections in wounds were noted by surgeons who made significant observations relative to treatment. However, the founding of the science of bacteriology by Pasteur and its application to surgery by Lister, brought the first rationale to treatment and prevention of infection in wounds. The students of Lister founded the principle of antiseptics, which acted potently upon the bacteria found in the air, on the patient and in the exudate. Following came the era of asepsis, in which modern surgery began. Through washing, irrigation, neutralization with chemical agents and adequate drainage, surgeons became more complacent, feeling that infection had been conquered.

World War I brought the realization that the accepted technic and chemicals were not entirely successful in combating wound infection. The failure to find new and more powerful antiseptics and the weakness of the prevailing methods of antisepsis led to the realization that wound repair comes from within. All the surgeon or clinician can do is to assist in overcoming or defeating the infection by (1) converting a dirty wound into a clean one; (2) removal of devitalized tissue which, when accomplished within the first six to eight hours (stage of contamination), is known as débridement. (This operative procedure was practiced by Baron Larrey—the famous surgeon of the Napoleonic campaigns); (3) consideration of the state of nutrition of the patient (which influences the end result) and (4) control of shock and replenishment of blood loss.

Infected wounds, of longer than six to eight hours, often respond with gratifying results if treated with the following principles in mind:

1. Free drainage.
2. Irrigation with mild antiseptic solutions combined with meticulous dressings.
3. Thick absorbent covering.
4. Immobilization of the part combined with selective pressure to control stasis, dead space and the amount of plastic substances that pour into a wound.
5. Infrequent dressings.

The fundamental principles circumscribing the capacity for regeneration and repair in wound healing is no doubt influenced by many unknown biologic factors. However, certain systemic and local factors are to some extent understood. Recognized local factors are:

1. Necrotic tissue and foreign bodies retard healing.
2. Areas with a rich vascular supply heal more rapidly than do those where blood supply is meager.
3. Wounds in aged animals heal more slowly and less firmly than in the young.
4. Fatty tissue heals more slowly than other tissues.
5. The water, protein content and the electrolyte balance determine the state of hydration of the tissue and affect the healing process. In such conditions the clinician must exercise critical judgment in the choice and amount of fluid to be administered.
6. Pressure enough to restrain the growth of connective tissue when applied to denuded areas greatly enhances the growth of epi-

thelium. The recognized systemic factors are:

1. A rise in temperature of 10° F. increases the rate of cicatrization twofold (Ebeling,[1] 1922).
2. Poor circulation is a barrier to prompt healing.
3. Nutritional balance of the patient with special reference to vitamin C enhances anabolic activity and hence hastens wound repair.
4. It has been stated that high protein intake hastens and high fat intake prolongs healing.
5. Other factors that may influence wound healing are radiant energy, hormones, and the sympathetic nervous system.
6. Providing the patients with comfort by grooming, keeping feed (hay) constantly before them, protection from inclement weather and from flies.

Furthermore, when there is injury to vital organs or the injury is attended by shock the treatment of these factors takes precedence. The degree of tissue injury when inflicted by flying missiles depends largely upon their kinetic energy which in turn is governed by their mass and velocity. High velocity projectiles often make only a small wound of entrance but cause devastating tissue destruction as they expend their energy in the deeper structures or by having their energy suddenly reduced by impinging on bone (Black and Burns[2]).

Usually the organisms that are present in primary infection are nonpathogenic. However, in the presence of altered blood and tissue, and lowered antitryptic power of broken down leucocytes, these non-pathogens multiply and produce clinical signs of infection and toxemia. The worst offenders in this respect are the spore bearing anaerobes and anaerobic streptococci. Anaerobes are usually introduced into a wound at the time it is inflicted.

Clinically, secondary infection is of paramount importance and the contributing influences are many. Of the virulent pathogens the hemolytic streptococci are frequent offenders which reach the wound through:

1. Contaminated hands.
2. Contaminated instruments.
3. The blood stream.
4. Improper débridement which, if not properly done, increases the trauma and amount of devitalized tissue and may even disseminate the infection.
5. Failure to obliterate dead spaces and mass ligation of tissues.
6. Use of irritating agents in the wound, which coagulate the cell proteins and further devitalize the tissue (Farris,[3] 1941).
7. Suture materials.

Sutures are foreign bodies and all cause a greater or lesser reaction characterized by accumulation of fibrin, increased heat, leucocytic infiltration and often swelling. Cotton, which is largely cellulose, appears to have advantages over silk, catgut, or nylon. Due to its natural twist there is less tendency for granulation tissue to infiltrate the interstices of the fiber, thus reducing possible nidi of infection. Being non-protein in character, cotton seems to incite less tissue reaction than does protein (silk). Furthermore, the onset of fibroplasia appears not to be delayed by cotton to the extent it is by other suture materials. The small size chromic catgut seems to be more tolerable than plain catgut. Steel wire lends itself well to the requirements of animal surgery. It is easily sterilized and resists deterioration.

Successful débridement depends upon a thorough knowledge of anatomy and of general features of wound healing. Since the skin is a fertile soil from which infection is easily conveyed into a wound, preparation of the skin and isolation of wound margins with sterile drapes before beginning épluchage cannot be emphasized too strongly.

During the stage of contamination (first six to eight hours) bacteria may be removed from the wound by mechanical cleansing. Whereas, in the stage of infection (sepsis) the bacteria have multiplied in the favorable culture medium available and have begun to invade the tissues. Campbell[4] (1942) in a timely discussion on contused injuries of the back of the equidae described the gratifying results obtained by using meticulous aseptic technics in contaminated wounds, some of which were of 48 hours' standing. This author further mentions the importance of good surgical anesthesia and minimum exposure of freshly incised wounds to the air. However, his observations lend support to the statement that if the operative wounds in

horses after a few days are exposed to the air they heal more rapidly than those that are closely covered.

Infection by anaerobes is frequently encountered in animals. A brief history of the anaerobic realm may be in order. To Spallanzani (1776) belongs credit for the discovery that certain bacteria can live in an anaerobic environment. Pasteur (1861) found that certain organisms were able to live and multiply in the absence of free oxygen. This is relative, since anaerobes and aerobes live in symbiotic relationship and perhaps the anaerobes obtain their limited oxygen needs in that fashion.

Of the aerobic spore-bearing bacilli that produce virulent infection in wounds of animals, the bacillus of anthrax is the worst offender. Closely allied with the spore-bearing aerobes are the chlostridia which are strictly anaerobes and produce a variety of diseases in different species. According to Merchant[5] (1942) "the diseases are manifest in two general ways: first, as an acute toxemia (as in botulism and tetanus where tissue changes are insignificant); and second, as a gas edema in which the edema is the general rule and gas formation is inconstant." The members of this group which often produce mortal infections in wounds are: *Clostridium chauvei, C. welchi, C. novyi,* and *C. tetani.*

From the standpoint of pathogenicity, anaerobic infection in a wound may become apparent within an hour or two or several days may elapse before distinctive features appear. Such infection usually presents the following train of symptoms:

1. A brownish or chocolate discharge composed of broken down blood clots.

2. The discharge (depending upon the infecting organism and the degree of infection in the wound) is foul, acrid and emits gas.

3. The intramuscular septa and adjacent connective tissue becomes swollen and doughy, due to serous infiltration. The surrounding zone of swelling becomes dusky red or purplish in color. If the infection is fulminating in character, the area is usually hot and painful at the onset and later becomes cold and greasy to the touch.

4. Soon after the onset of the infection the muscle tissue is invaded by the organisms and soon thereafter digested. Where the infection spares the blood supply the course of the infection may be traced through the muscle which becomes black, friable and diffluent.

5. After the muscle loses its contractility it undergoes changes in color, becoming first red then greenish yellow and lastly black.

In the type of infection, where the gas forms first between the muscle fibers and thereby compresses the fascial sheath and shuts off the blood supply, the field becomes more fertile for infection. Here the muscle becomes first a livid red, which gives away to a greenish blackish mass.

Clinically, the symptoms vary with the type of infection present. A localized anaerobic infection is characterized by a fetid discharge mixed with bubbles of gas. If the disease is more extensive, swelling is in evidence which, upon percussion, is tympanic.

Wounds that have poor drainage, extensive devitalization and death of tissue, with an inflammatory exudate rapidly forming in unyielding tissue, often result in gas gangrene (a clinical entity but not a specific disease). Good examples of inflammatory gangrene are deep abcesses, necrosis of bone, and decubital ulcers.

Fatigued animals are far more prone to develop infection than are fresh mounts. Feeble circulation, or diminished blood supply to a part prevents active intervention by the protective mechanisms of the body.

The infection in a wound is anaerobic in character until the muscle is attacked, then gas gangrene supervenes. Many clinical variations of gas gangrene may be seen at this point:

1. A localized infection where the muscle becomes black, friable and diffluent. The line of demarcation between the live and dead tissue may be seen.

2. A slow spreading type usually evidenced by yellow zones, some pain and slight crepitation. A fetid odor is usually present due to nitrogenous products such as indol, and partly to non-nitrogenous products such as sulphuretted hydrogen, butyric and lactic acids.

3. In the third variety there is swelling and crepitation. The skin develops *fibrillae,* accompanied by blood stained serous fluid. Often a purplish red color that becomes a greenish yellow is seen in the skin. In appearance the muscle at first is dull and varies in color from opaque to a brick red, and when incised does not bleed. The blood stained fluid is mixed

with gas and the muscle becomes brown and finally black, with the loss of contractility. In cases where the blood supply is cut off, as by thrombosis, the animal will manifest pain and an increase in pulse.

4. The fulminating type is ushered in by extensive swelling of the affected part and severe pain in the early stages. The severity of pain depends upon the increasing pressure and the establishment of infection in the wound. The pulse is rapid and thready and the patient's temperature is 3 to 5° F. above normal. The writer has seen animal patients that became icteric in the terminal stages. Also the extremities become cold and the visible mucus membranes cyanotic.

Among the large variety of aerobic bacteria that may gain entrance into a wound, the streptococci, especially the beta hemolytic and members of group A in Lancefield's classification (*Streptoccus pyogenes*), are important pathogens. In the writer's experience they are to be feared because of their great invasiveness, especially if they gain entrance early, before the body defense has developed. If the infection occurs after granulation tissue has developed, usually there are no clinical symptoms, but healing is delayed. These organisms, however, often invade the tissue and make necessary subsequent surgical interference. Such phenomena have been witnessed by the writer on more than one occasion in sitfasts on the neck of the horse and on large abraded surfaces that were exposed to trauma, such as "collar galls."

The staphylococci infections are common in wound infection. The pathogenic members of this group are the pyogenic staphylococcus aureus group. They may be recognized by their power to produce coagulase, which coagulates blood serum in a test tube. Being less invasive than streptococci they may, however, set up subacute pyemia or fulminating septicemia. The skin is a common source of such infections as these organisms live in the ducts of sweat and sebaceous glands. They frequently infect operative wounds in both the canine and equine species.

Other less virulent organisms which may infect wounds and interfere with healing are *Escherichia coli* and *Bacillus pyocyaneus*. The diphtheroids and *Actinomyces necrophorus* cause false membrane formation upon mucous surfaces.

The healing of wounds is a most fundamental process between destruction and repair in which the degree of tissue destruction and the degree of asepsis are the cardinal principles that influence the time required for repair to set in.

Campbell[6] (1942), in an excellent treatise on "Treatment of Wounds in Army Animals" very ably discusses and summarizes the newer technics now used in the treatment of wounds and their complications in animals. This author reviews the widely recognized "Winnett Orr" method of wound treatment on humans and its modification by Trueta during the recent Spanish Civil War in a concise and entertaining manner. The same principles may be applied equally well to animal patients.

A mule with shoulder galls

Almost immediately after a wound to tissue is sustained, there accummulates in the wound space, and to a lesser degree in the interstices of the adjacent uninjured cells, an inflammatory exudate which is made up mainly of coagulated blood and plasma, held together by interlacing strands of fibrin. Into this damaged area, cellular components of the blood, wandering tissue cells and new capillary buds are attracted. The capillary loops make new vascular tissue that is florid in complexion. This granulating tissue pulls the wound edges together as the fibroblasts mature. The method which nature employs to polish the surface of a wound to contract its diameter and to fill it even with the surface of the adjoining tissue is known as cicatrization. At first the newly formed tissue is highly vascular, soft and bluish in color. Afterwards as the vessels decrease in size and number and the

fibroblasts become compressed between the bundles of new fibers the young vascular tissue becomes a dense white, non-vascular mass of scar tissue.

The process of healing fails to progress to firm scar formation in the absence of collogen formation. Excessive amounts of exudate, damaged tissue, infection and inade-

Hazards of infection make kicks by shod horses particularly troublesome

quacy of blood supply also impair healing.

Wounds in epithelial tissue soon show proliferation at the edges. However, if chronic infection prevents the epithelium from covering the surface, the epithelium often sends long filaments down into the cutis beneath. Such a chronic inflammatory process progresses into an indolent ucer that resists healing.

Cavities in bone that are filled with autolytic blood may fail to fill completely and heal, due to the comparatively non-vascular character of osseous tissue.

Normal healing is dependent upon certain fundamental phenomena such as mitotic proliferation of cells, ameboid movement of cells and maturation of cells engaged in the coalition of wound surfaces. The presence of blood and tissue fluids stimulates the ameboid movement of cells. While on the other hand, a poor supply of oxygen and nutritive substances in the ischemic border of a wound often causes anoxia and tissue hunger, accompanied by cell division and ameboid activity of endothelial buds and fibroblasts. The phase of wound healing in which the phagocytes remove the dead tissue elements (lytic phase) immediately follows tissue injury. Reparative processes begin during the latter part of the lytic phase which, for this reason, is sometimes referred to as the lag phase. There phagocytosis, incoming wandering tissue cells and proliferation of fibroblasts sow the seed for two fundamental process to begin functioning:

1. The young fibroblasts elongate along the fibrils of the fibrin network in the coagulum filling the wound space.

A similar sterotropic response of growing cells is the ameboid movement of epithelial cells along the plane surfaces of granulation tissue and beneath eschars.

2. Young growing cells tend to grow away from their own kind and into the plasma clot that fills the wound space. This phenomenon of centrifugal force is also exhibited by the endothelial buds. The firmness of wounds increases, as the fibroblasts mature and contract and the surface epithelialization progresses.

Wound healing is influenced by both systemic and local conditions. The most important systemic conditions are:

1. Age of tissue; whether senescent, normal adult or adolescent. Aged tissues often undergo vascular changes that retard healing.

2. The amount of hydration of the tissue, as determined by electrolyte, protein and water balance in the blood, is of utmost importance to wound healing. Water is a universal solvent which carries nutrient elements and waste products in solution. They must be isotonic with the blood. Therefore, adequate quantities of available fluids are essential to promote normal wound healing. (Coller and Maddock,[7] 1940.)

The state of hydration of surgical animal patients may be measured by (1) the specific gravity of the blood as determined by the falling drop method. By this method the concentration of the blood is determined which when transcribed onto a chart gives the level of the blood proteins. (2) urinary output and (3) the injection of normal saline into the skin thus forming a wheal. The rapidity of absorption from the wheal is a useful guide as to the degree of tissue hunger for fluid and salt.

Among other factors that influence wound healing, electrolyte balance is very important. Sodium chloride being almost entirely responsible for the osmotic pressure of the intercellular fluid, an excess of salt in the tissue attracts fluid with the result that the tissues become edematous. In this state tissue will not heal promptly, probably because of altered pressure relationships that interfere with the normal ingress and egress of metabolites. Likewise the lack of salt in the tissues allows fluid to be lost to the vascular tree, with consequent tissue dehydration. Therefore both fluid and salt balance is essential to proper wound healing.

As the quantitative level of the colloid element of the blood (protein) is decreased, fluid leaves the circulation to accummulate in the tissue spaces because of the altered osmotic pressure and the diffusion gradient. Ravdin[8] (1940), working with dogs demonstrated that 70% of the cases developed abdominal wound disruption, when operated upon in the presence of hypoproteinemia. These cases showed little or no fibroplasia up to two weeks after the operation. These findings were contrasted by prompt healing, and a very short lag phase, when the subjects were maintained on a high protein intake.

When tissue is injured it loses its neutral reaction. The area of injury accumulates acid metabolites and split proteins products, which come from protein cleavage in the dead tissue. These factors shift the pH to the acid side and attract neutrophilic leucocytes to the area. If the acidity should exceed the optimum point the neutrophils die and are replaced by the macrophages. If enough of the dead tissue undergoes phagocytosis, the acidity decreases and the inflammation regresses. However, should the macrophages be destroyed and the acidity increased, suppuration results. When the neutral stage is regained the lymphocytes and plasma cells migrate to the site of reaction.

Vascularity of tissues is probably the most important local factor involved in wound healing. Any interference with the local blood supply to a wound, seriously retards healing. Blood transports the cellular and nutritive elements which aid wound healing to the site of injury and it carries away waste metabolites.

Injuries may occur to the arteries or veins or to both. In case a large vein is severed, ligation is in order, as the vein pattern is multiple in its architecture with ample collateral channels to care for the venous supply. In the case of injury to a large artery, suturing of the vessel should be considered. If this cannot be accomplished then the artery and its satellite vein both should be ligated. This procedure prevents quick drainage of blood from the injured area and delays ischemia.

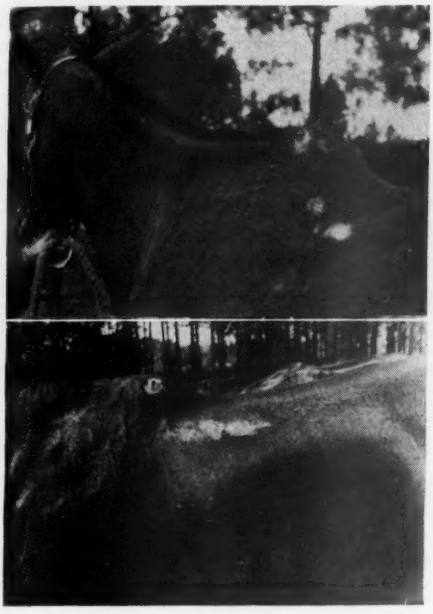
The role of the lymphatics in wound behavior has been overlooked too often. Their funtion has remained largely unknown. McMasters[9] (1942), in a discussion of "Lymphatic Participation in Cutaneous Phenomena" demonstrated, by the use of dyes, the abundance of lymphatic vessels in the skin, that the lymphatic capillaries respond readily to stimuli and that they take an active part in fluid exchange. Using mice, he showed that a dye when introduced into the lymphatics of the ear may escape from the severed lymphatics into a wound made five hours earlier by incising the superficial lymphatics and blood vessels. The blood vessels had long since constricted and closed whereas the lymphatic channels remained open. This fact may readily explain the frequency of infection by way of the lymphatics.

The rapidity of wound healing is interfered with in varying degrees depending upon the amount of exudate in the wound space and adjacent tissues.

The same can be said concerning the number and type of infectious organisms in a wound. Furthermore, the type of habitat that the wound furnishes for the organisms controls the type or types of germs that can live there. In addition the habitat controls the degree of encouragement to their existence, proliferation or death.

As we come to better understand the mode of action of vitamins on the physiological activities of animal tissues we are impressed with the growing evidence of the importance of vitamin C in body synthesis. According to Reid[10] (1943), "ascorbic acid is

known to be involved in the synthesis of collogen and reticulin, carbohydrate containing scleroproteins found in bones and connective tissue and in smaller amounts in other animal tissues." There is evidence of physiological interrelationships of ascor-



CONTUSED WOUNDS OF THE WITHERS

No two cases are alike. The one shown at the top may not be particularly serious although there is much swelling. When the serum is evacuated and the swelling subsides it may be found that the skin injuries are superficial and that none of the tissues underneath are so badly injured as to require removal. The case shown below may be quite severe; the injury being in the nature of a sitfast extending possibly as much as two inches into the underlying tissues. The emaciated condition of the animal, the engorged superficial veins and the desiccated appearance of the abraded surface warn the surgeon against any rosy prognosis

bic acid and calcium in plants and animals.

Microscopic studies have shown the cell surface to have a cortical layer of cytoplasm which is controlled by calcium ions which, in the case of the ameba, brings about rigidity of the ectoplasm but decreases the viscosity of the endoplasm. Reid states that Chambers found that, when the internal cytoplasm of a cell was exposed by injury, no repair took place in the absence of calcium, due to the inability of the protoplasm to form a new interface. Reid mentions that Zweifach observed the permeability of capillaries to be due to the nature of their cement and absorbed layer of protein, rather than the cells. This investigation demonstrated that when the circulatory fluid contains calcium the cement substance is reformed after interruption and normal permeability is reestablished.

Chambers[11] (1940), in discussing permeability of three types of cellular membranes in multicellular organisms, states that there is apparently interrelated action of calcium and ascorbic acid. He cites the fact that the permeability of a membrane like the "endothelial lining of the blood vessels" is determined by the abundance of cement present rather than by the cells. The permeability of the second type membrane (such as the intestinal mucosa) he believes to be due to both the intercellular cement and the cells. The permeability of a third type membrane (such as is found in the walls of the proximal tubules of the kidneys) according to this investigator, is determined by the close fitting together of the cells.

Vitamin B_1 has been shown to assist in wound healing, especially the healing of nerve tissue. This vitamin acts as a coenzyme of the corboxylase enzyme regulating nerve metabolism. In acting as a coenzyme it decarboxylates pyruvic acid, forming acetaldehyde and carbonic acid from it.

Vitamin D_2, irradiated ergosteral (calciferol), is probably the most important of the sterols in cell physiology. The sterols apparently are responsible for the selective permeability of the cell membrane. They also enable the cell membrane to change its colloidal state from a water in oil to an oil in water phase which allows for both oily and aqueous nutrients to be taken in by the cell.

Temperature changes through the application of heat and cold are often more of a disadvantage than an advantage to wound healing. The application of cold to tissue, where the damage is great, probably aids healing more than does heat. Furthermore, cold decreases metabolic needs to where a damaged circulation may be sufficient.

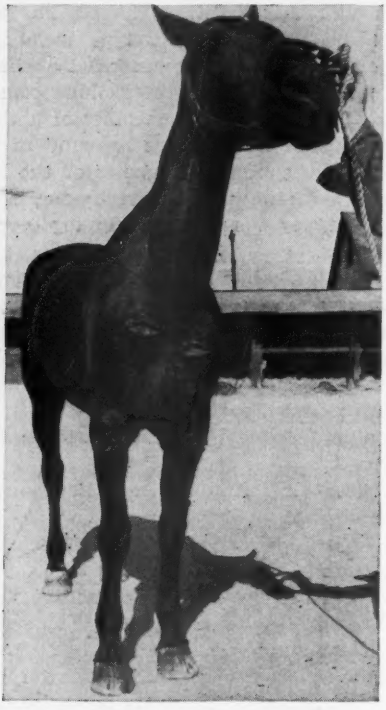
The irrational use of heat on wounds may

result in some serious disadvantage such as:

1. Heat is not removed from a part by injured vessels with the result that it accumulates and increased tissue damage results.

2. Heat increases fluid loss from the capillaries, thus increasing the edema. The edema may be an advantage in that it may contain antibodies and the swelling may occlude the tissue spaces and thereby prevent bacterial spread. On the other hand, edema may decrease circulation, increase pain, and prove a favorable medium for bacterial growth and dissemination.

3. Heat may increase the local tissue metabolism to a point where the injured circulation cannot supply the increased amount of nutrients needed by the tissue. An excessive edema often increases pressure and the amount of fibrosis which may lead to dysfunction of the part.



Contacting a wire fence may prove quite serious

With the clinical application of the above principles, favorable results will be obtained. A large number of agents and methods for wound treatment have been recommended but no ideal method has been discovered. However, it is well to keep in mind the outstanding points in the application of the various agents in an attempt to improve upon accepted technics of wound treatment in animals. The dead animal reveals only the end of the disease process. Therefore the clinician or surgeon must have a sound understanding of things pathological, or he will flounder about in aimless fashion and the weeds of disease will go unrecognized in the incipient stages to sow nothing but disappointment in the end.

Campbell[4], in an excellent discussion on treatment of several hundred back injuries during the army maneuvers in 1941 states it well, when he says: "Veterinary officers must never lose sight of the fact that the primary function of the medical man is to cure. It doesn't require a college course to aim an automatic. Killing animals is a confession of failure."

Fundamentals that are to be taken into account when treating wounds that are seen not more than eight hours subsequent to their occurrence are:

1. Keep foremost in mind as primary consideration the vitality of the tissue involved; its blood supply, its tolerance of insult and its regenerative potentiality.

2. Control of hemorrhage if present; to prevent shock from excessive blood loss and anoxia. Avoid the formation of large blood clots which are favorable seed beds for infection.

3. Control of shock, if present. In the absence of hemorrhage, treatment of shock takes precedence.

4. Irrigation of the wound with tepid saline or a mild antiseptic non-irritant solution. Strong antiseptics add further injury to traumatized cells.

5. Removal of devitalized tissue (débridement) with care, as rough handling and mauling of the tissue increases the trauma of the already injured area.

6. Removal of foreign bodies, including all visible dirt.

7. Primary closure of the wound, employing appropriate anesthesia, depending upon the time that has elapsed since the injury and the amount of obvious contamination. The approximation of the wound edges should be accurate and come into apposition without producing tension. Primary closure of a clean wound is usually indicated up to 8 to 10 hours. However, good results have been obtained in

wounds of much longer duration by implanting sulfanilamide in the wound at the initial treatment. This possibility was clearly demonstrated with gratifying results on a large assortment of cases discussed by Campbell.[4, 6]

8. Sterile dressings, with provision for adequate drainage.

9. Tetanus prophylaxsis, 1500 units of tetanus antitoxin followed on the third day by another 1500 unit dose. It is of interest to note that Campbell[4, 6] discusses the treatment of more than a thousand wounds in horses without the use of tetanus antitoxin. These animals had received texanus toxoid. No case of tetanus developed.

BACK CASES TREATED BY THE AUTHOR

Upper left: Typical contused wound of the withers. Such injuries are incurred by cavalry horses—most frequently about the withers but were common on the ribs and beneath the cantle

Upper right: Anesthizing the surgical field. Note the large area that is shaved and disinfected. These operations were rendered practically completely painless by the use of novocaine. For an operation of this magnitude about 100cc of the solution was required. None was injected into tissues that would later be invaded by the scalpel

Lower left: Showing the skin incisions. Note the incisions do not go to the top of the withers. Uninjured tissue at the top limits movement of the parts. Movement of a properly treated wound at this location is the chief deterrent of rapid healing, hence the incisions are made as low as the nature of the injury will permit and only injured tissue is removed. Often even when the swelling is great very little tissue requires excising. The protective towels used during the operation have been removed to permit better photographing of the area

Lower right: An operation on a particularly serious case. Wounds of this width require a long period to heal. Although the swelling in this case was only moderate the surgeon found much injured tissue which required the excision of a wide strip of skin and underlying structures. Continuing the incision to the midline on the withers also is objectionable and to be avoided whenever possible

Infection of a wound is injurious for two reasons: (1) infection delays healing. (2) the infection itself may prove fatal.

The infecting bacteria may gain entrance at the beginning or may be introduced later. Anaerobic organisms are usually introduced into the wound at or immediately after its occurrence. On the other hand, the aerobes are likely to gain access into the wound sometime later.

Antisepsis in wound healing is not accomplished by the use of magic, colored solutions with which is is hoped to kill bacteria and do no harm to the tissue. Pouring strong antiseptic solutions into a defenseless wound only adds to the tissue burden and is to be discouraged. Washing with clean soap and water and flushing the wound with tepid saline solution will usually remove the nonpathogens. Frequently dressing delays healing.

The writer has used with success as a skin preparation an inexpensive alcohol-acetone solution which kills practically 100% of the staphylococci and diphtheroids. It is made up as follows:

Alcohol (70%)	3116cc
Acetone	478cc
Cresol	19gm
Mercury bichloride	3gm
Water	175cc

Add the cresol to the alcohol-acetone mixture: dissolve the mercury bichloride in the water then mix the two solutions.

Oily, heavy grease ointments are not recommended for use on infected wounds since they form a coating that provides anaerobic conditions in the wound.

Adequate drainage is an important principle to be applied to all wounds. This is accomplished by liberal incision taking care not to sever large vessels or nerves and also by implanting sterile wicks or rubber tubing secured by sutures.

The maintenance of fluid and electrolyte balance is of prime importance in preventing tissue dehydration. Adequate intake of vitamin C is necessary to maintain the stability of the intercellular matrix. It is thought by some that a normal calcium level plays an important role in maintaining the normal permeability of the capillaries by stabilizing the cement substances between the endothelial cells of the capillary wall.

Body elimination must receive due consideration to avoid accumulation and retention of toxic end products of protein cleavage and metabolites in the body.

Débridement followed by topical application of sulfanilamide, or other sulfa compounds, and accompanied by administration of the same *per os* is highly recommended. Sulfanilamide and its derivatives are apparently bacteriostatic by virtue of their power to prevent bacteria from utilizing oxygen. Sulfathiazole is well tolerated by mouth or in ointment form. The writer has seen very good results obtained in cases of fulminating septicemia resulting from wound infections, by giving neoprontosil intravenously and then following up with oral administration of sulfanilamide.

In operative wounds, infections, decubitus ulcers, empyema, and abcesses where there was no septicemia present, rapid healing by topical implantation of sulfanilamide powder or crystals has been secured. Sulfathiazole, being less soluble than sulfanilamide, is not as well adapted to topical application as is sulfanilamide. Recent research indicates that sulfadiazine may be more effective as a topical application than is sulfanilamide.

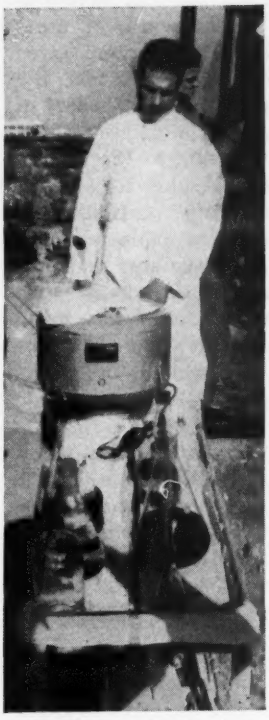
Blood plasma has a definite value in wound healing—especially in suppurative wounds that heal slowly. Plasma supplies protein which is a component of every living cell and is the most valuable constituent of living protoplasm. The protein derivatives found in plasma (albumin, globulin and amino acids) all yield nitrogen that is utilized in fundamental processes such as: production of energy, replacement of tissue and nutritional repair. In addition to the above protein derivatives, fibrinogen and prothrombin play the most important role in blood clotting. Fibrin furnishes also the structure in which the endothelial buds and young fibroblasts lay down granulation tissue — the first permanent structure formed when a wound begins to heal.

Normal plasma (4.5 to 6% plasma protein) is to be preferred to concentrated plasma (15 to 20%) for infusion of patients that are in shock produced by dehydration and hemorrhage. This is borne out by an improvement of the blood pressure, circulating time, carbon dioxide content of the blood and a more rapid clinical response in animals which receive infusions of isotonic plasma. Dehydrated animals that have progressed into shock should not receive concentrated plasma. Apparently the increase in the intravascular volume is at the expense of the extravascular fluid which adds damage to tissues that are already injured by oligemia and anoxia. Rapidly infused concentrated plasma seemingly adds burden to the heart which is manifested by a temporary drop in the diastolic pressure and a bradycardia.

Following severe hemorrhage in a horse or dog, there is a hemodilution rather than a hemoconcentration as a result of the body's effort to compensate for the loss of fluids, the lost cellular elements being re-

stored more slowly than the escaped fluids.

If concentrated plasma be given to patients that have become dehydrated through hemorrhage, their bodies have to mobilize extra fluid so as to restore osmotic equilibrium of the blood. Furthermore, concentrated solutions that contain large quantities of citrate sometimes produce tetany by fixing calcium ions in the blood.



Blood plasma in the treatment of animals was first used in the 30th Veterinary General Hospital during 1941. At that time it was not available from commercial sources and was made up as needed in the hospital. The illustration shows some of the equipment used in the manufacture of blood plasma in the field and a corporal who assisted Captain Utterback in its preparation

Physiotherapy is a field that may well be given more study as to its merits in animal medicine. The low voltage currents were among the first to be used in alleviation of human ills. In speaking of low voltage currents we allude to the galvanic and sinusoidal currents with which much can be accomplished in pathological conditions that do not warrant radical treatment.

The galvanic current is a direct constant current that flows in one direction and has a definite polarity. Each pole has a definite action. The positive pole is acid in reaction and sedative in effect. It acts as a vasoconstrictor arresting hemorrhage and hardens and contracts tissue. It dehydrates tissue and assists in decreasing inflammation. The negative pole is alkaline and caustic in effect. This current acts as a vasodilator and increases hemorrhage. It softens and relaxes tissue even when fibrosis is present.

The sinusoidal current is an alternating one and has no polarity or chemical action. Its effect is mechanical, stimulating muscle and nerve tissue. It tones up both striated and unstriated muscle and resolves stasis. Furthermore, it furnishes cellular massage, increases metabolism, secretion and excretion.

In conclusions, let it be said that the clinician should be familiar with the gross appearance of diseased tissue. Moreover, he must be well enough grounded in the basic medical sciences to say what type of pathologic process the cut surface of diseased tissue indicates, and judge wisely the proper course to follow.

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Problems in Swine Practice*

By T. L. STEENERSON

Wilkinson, Indiana

PROBLEMS in swine practice cover a wide range of conditions and a variety of diseases. It will be the intent of this paper to point out only the major problems encountered in 18 years of hog belt practice, supplemented with suggestions for their correction.

Generally speaking, our major problems might well be divided into four headings—(1) breeding (2) feeding (3) disease and (4) dissemination.

Before taking up the individual subjects, it is in order to note that the membership of this organization consists of men, regardless of their personal labors, who have a united interest in the improvement of live stock, and it would seem that any improvement project projected should take breeding, feeding, disease and the dissemination of disease into consideration. Such a program, to be successful, must be firmly anchored to veterinary science, and it is indeed very gratifying to note that the practice of veterinary medicine is receiving increased recognition and a deserving place in the field of animal and human health control. Greater recognition brings forth greater responsibilities which veterinarians must accept and faithfully discharge.

Breeding

The year just closing has brought forth a bumper pig crop. For the coming year, an increase of 25% has been requested. Too many of our swine producers interpret this as meaning that they should breed 25% more sows. The average producer breeds too many sows. Available equipment, facilities, feed, and his capacity for work should govern the number of sows to be bred. Over crowding, lack of proper feed, water and care are responsible for many losses of baby pigs and shoats up to four months of age.

The foundation of an effort to increase pork production 25% should lie in the selection of breeding stock. Our major problem in this connection is our inability to get breeders educated to the fact that they should never breed animals that have previously had enteritis, influenza, or other febrile diseases. Too much attention is given to the appearance of the individuals, and not enough thought given to the history of past production records and disease records. When it is possible to talk to the breeder before he selects his breeding stock, these points are discussed with him, advising him that it applies to both the dams and sires. At the same time, it is suggested that gilts be at least seven months old and boars nine months old before breeding; that males should not be permitted to run with the herd, and that not more than three services in a twenty-four hour period should be permitted.

If these thoughts on the selection of breeding stock can be instilled into the hog breeder, and he complies with them, a big step forward has been accomplished in the raising of larger litters, healthier pigs, and the reduction of baby pig mortality.

Feeding

The best breeding stock in the world will do little good unless considerable attention is given to the feeding program. Once again, the problem of the practitioner is to find some means of getting his client to come in and discuss his feed problems with him. If the practicing veterinarian will familiarize himself with known and fundamental facts regarding feeds and feeding, as well as the care and management of the dam during pregnancy and at farrowing time, it will not be long until the swine breeders of his community will realize that he can give them some valuable information, and they will regularly seek his advice. This is a responsibility of the veterinarian, and if he fails to perform this mission, he is not measuring up to his duty, either as a veterinarian or a citizen of the United States.

Abnormal conditions exist. New equipment cannot be obtained. Labor is scarce. Many feeds, especially supplement and ani-

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mal proteins are below par due to glands and other products which they formerly contained, being diverted to other uses. Tankage is no longer the food balancer that it was in the past. Even the grains, due to soil depletion, do not contain the necessary amount of chemical and vitamin units. It is, therefore, important, if possible, to secure these elements from other sources and incorporate them in the feed.

It is believed by many that a hog is more capable than man in selecting the feed for its body requirements

In the past many experiment stations, including our own Purdue University have used fish meal, meat scrap, soybean meal, cotton seed meal and ground alfalfa to good advantage. However, at least some of these ingredients are now off the market and I question if it is advisable for the swine producer to attempt to find substitutes for these.

Commercial supplements, if purchased from reliable firms who have the facilities and personnel for manufacturing good feeds, should be recommended over the feeder's attempt to make his own.

It is believed by many that the hog is much more capable than man in the selection of its body requirements therefore, it might be best to feed all supplements, minerals, etc., free choice,—either in a separate compartment of the self feeder or in a separate feeder. This was brought out quite forcibly this year when herds had access to some of the most lucious alfalfa and clover pastures ever known. In instances where the supplement was fed free choice and the hogs were running on these fine pastures, they ate very little supplement. If they were taken off of the pasture, they would immediately start eating large quantities of the supplement.

At this season of the year, a simple ration for the brood sow is suggested in the form of ground corn and ground oats, in the proportion of one bushel of each to which ten pounds of supplement is added. This can be fed by hand or in feeders. If fed in feeders, it can be improved by addition of ten to twenty pounds of high quality ground alfalfa. If hand fed, alfalfa hay should be placed in racks in dry accessible quarters. Sows should have free access to a mixture of equal parts of calcium carbonate and steamed bone meal, plus 10% salt and ¼% potassium iodide.

This type of feeding program, allowing the sow suitable range, fresh clean warm water, comfortable quarters and a dry bed should be ample to produce large, strong, healthy litters. Feed is withheld twenty-four hours before and forty-eight hours following farrowing, after which she is gradually brought back to full feed. The time required being ten days to two weeks.

Feeding of the dam after farrowing depends upon the type of feed that the producer might have on hand. The self feeder can be profitably employed in this class animal. The diet may consists of 60% corn, 33% oats and 7% supplement, plus range and pasture in season, fresh water, and free choice to the simple mineral mixture being essential.

The pigs, at two weeks of age, should have free access to ground feed consisting of 60% corn, 30% wheat, and 10% supplement which is fortified with vitamin D. This same formula can be profitably fed until such time as it is desired to place them on full feed of corn, preferably shelled, *via* self feeder, plus free access to a suitable supplement and ample water supply. A mineral mixture consisting of equal parts of calcium carbonate and steamed bone meal, plus 10% salt and one-fourth of one percent potassium iodide, free choice, will suffice. Pigs handled in this manner should weigh two hundred to two hundred and fifty pounds in six months.

Disease

If the dam has been fed and handled as previously suggested, *pre-natal scours* will not be a problem.

Post-natal scours is always a problem in swine practice. It is invariably due to having selected breeding stock that had previously gone through some febrile disease, had improper feeding, sudden changes in temperature, or unsanitary quarters. Proper management will eliminate most of this.

There is a bacterial infection which frequently affects young pigs, causing heavy losses unless it is recognized early, when the prompt administration of a *Salmonella cholerasuis* bacterin will reduce the mortality.

Pig anemia has ceased to be a major problem because of the splendid research work started at Purdue University by the late Dr. R. A. Craig, and finished by Dr. L. P. Doyle of the same institution. As you know, it was a condition that was responsible for tremendous pig losses and many stunted shoats. Its correction lies in permitting the sow and litter to have access to clean, uncontaminated soil, providing equipment and weather will permit. Otherwise, blue grass sod collected from an uncontaminated source should be placed in the pen or farrowing house where the pigs will have access to it. It is not necessary that the sow have the sod.

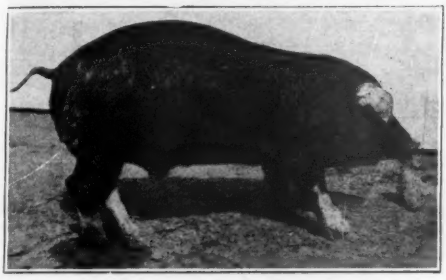
Pig pox, frequently overlooked or considered unimportant, is a problem in swine practice that deserves consideration. It can easily be the cause of a heavy mortality, especially if the herd is subjected to the introduction of serum and virus during the initial attack. Close observation on the part of the attending veterinarian can prevent this loss. In pox infected herds, lime and sulfur dip, both internally and externally, has definite merit. This year, in my practice, pox has been very severe and for the first time I have observed it in the ears of pigs, causing them to carry their head sideways. Sulfurized oil in the ear seems to eliminate this trouble.

Internal parasites are a problem in that they cause some mortality and the economic loss runs into thousands of dollars. Sanitation, if religiously applied will reduce parasitism to a minimum. However, few hog raisers have the equipment and the initiative to carry it through. Promiscuous use of the many nostrums available on the market does not solve the problem and in many instances is responsible for quite heavy losses. Herd treatment is not satisfactory. Treating each individual animal by means of the stomach tube, with a combination of oil of chenepodium, castor oil, and raw linseed oil has proven much more satisfactory than any other method. It is fast, efficient, and highly professional. When used, pigs are fasted for sixteen hours before and twenty-four after the treatment is administered. Sixty hours after treatment, the herd is transferred to clean ground and sleeping quarters.

A common condition to be observed on many farms. Pigs root in the wallow for food. Lack of sanitation leads to diseases of many kinds. Hog wallows, ascarids and runty pigs are often found together

Swine Erysipelas

Proper diagnosis is the major problem confronting the practitioner in regard to this disease which is increasing year by year. Autopsy findings may be and often are misleading. To make a diagnosis of erysipelas and later to find the virus of hog cholera the active causative agent, is a serious and costly error. Laboratory help is



Swine erysipelas in which the tail is involved

highly beneficial, but necessarily slow. History and herd observation is very important. Once properly diagnosed, administration of anti-swine erysipelas serum gives gratifying results. The use of this serum gives only a temporary immunity, and in many instances it is necessary to repeat its use in twenty to thirty days' time. Immunization by means of the culture-serum method is not permitted in Indiana, so I am familiar with their results only as I read them, and not from experience.

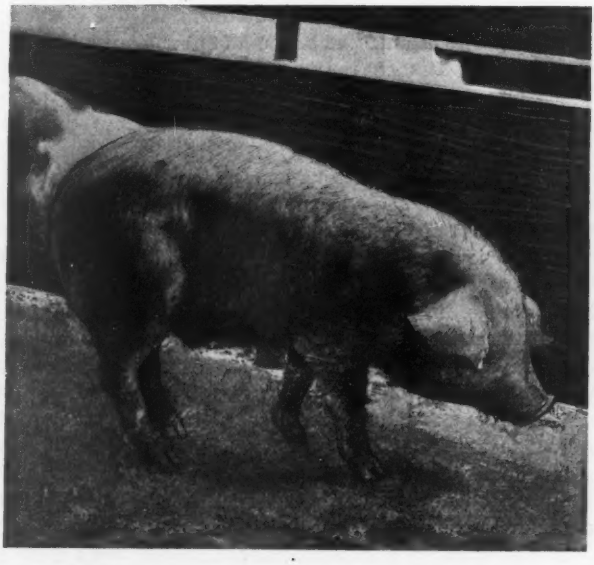
Hog Cholera

If the swine producer neglects the proper immunization of his herd this disease becomes a problem. The mere mechanics involved is not important. It is highly important, and profitable, to know the physical condition of the herd. Of equal importance is the selection of products of known potency and virulence and the administration of sufficient quantities to produce active and lasting immunity Cheating the pig by underdosing should not be tolerated under any circumstances and this day and age when the entire world is looking to us for more pork products it seems advisable to be more liberal than ever with our serum dosage. When normal healthy pigs of suitable age and weight are subjected to a liberal dosage of potent anti-hog cholera serum and virulent hog cholera virus, then 99% of such herds are immune to hog cholera.

Pneumonia, uncomplicated, is wide spread and at times very active. Improper feeding, poor housing, and poor management are responsible for this problem. Mortality is not great if these causative factors are corrected. Quite recently, with the advent of sulfathiazole, when administered at the rate of one-half grain per pound weight, and given in conjunction with symptomatic treatments, it has proven a near specific in its cure.

Enteric Diseases

In their many and varied forms, enteric diseases take an enormous toll throughout the hog belt, and constitute one of the most serious problems that the veterinarian has to face. It is a mistake to draw too fine a line of differentiation between these conditions or to classify them as feed lot infec-



An animal in an advanced stage of acute hog cholera

tions. Practical experience and observation would indicate that 85% or more of the enteric diseases of swine not only can be prevented, but can be relieved by proper feeding and management.

The swine producer, who will religiously follow the feeding and management program outlined in this paper and practice reasonable sanitation, can eliminate most of this type of swine production problems.

Infectious Hemorrhagic Dysentery

In years past the mortality rate of this disease has been exceptionally high and once it has developed in a community, it has proven an exceptionally serious problem in swine practice. Most men in this audience are familiar with its history, symptoms and post-mortem lesions. Some of you may not be familiar with a successful method of treatment. Here, as in most other disease of swine, too much stress cannot be placed upon segregation, observation, feeding and management. They are extremely important.

The animals that die are those that become too weak and prostrated to eat and drink. Such animals, if they are to recover, must be treated by the veterinarian as individual patients. A stomach tube is passed on all such patients once every twenty-four hours, through which is given a quantity of a very highly concentrated saline and alkaline solution. It is a rare occasion when this has to be done more than two or three times to get patients back again on their feet.

All animals that are strong enough to eat are fed a diet of finely ground oats, which has been soaked in this same highly concentrated liquid for twelve hours. An ample supply of fresh water, located near the feeding troughs, must be provided. Careful nursing, special feeding and strict sanitation are essential and necessary if recurrences are to be avoided. A mixture of finely ground oats, alfalfa and wheat seems to be a satisfactory diet during convalescence. Corn should be avoided. Alfalfa and clover pastures are preferred. When started back on corn it should be done very gradually and at least thirty days should be consumed in bringing them back to full feed.

Swine Brucellosis

This disease is not only a problem in swine practice, but it is equally a problem of the swine industry and to the public health authorities, due to its apparent pathogenicity to man. At the present time, research on swine brucellosis is going on

Orchitic testicle in a boar affected with brucellosis. The agglutination test at this time was 1:25,600

in full force at several of the research stations in the hog belt. This is very encouraging, and all veterinarians, as well as swine breeders, should offer these institutions their full co-operation. The agglutination test is being used as a means of detecting the infection. So far this has not proven very satisfactory when it comes to picking out the individual animal infected, but it does have considerable merit in detecting herd infection. No immunizing agent of value has been developed, nor have any chemicals or pharmaceuticals proved of value as a treatment. Isolation, sanitation, and consultation with the nearest research group, seem to be in order.

In all of the above disease problems of swine, the thing of paramount importance is correct diagnosis. This is not always easily nor quickly made. It requires patience, keen observation, careful and diplomatic enquiry, often more than one call, complete and diligent necropsy and, occasionally, laboratory confirmation. Autopsy findings are very often misleading unless they conform to herd history and observations.

It is well to remember that any bacteremia will produce hemorrhages and pathological changes in the animal body. This fact alone should be enough evidence to prove that no greater mistakes can be made than to attempt to make a "long distance" diagnosis of swine diseases by arriving at a diagnosis on one or two animals brought to the office or hospital. This applies to the practicing veterinarian as well as to the experimental station or commercial house that operates a diagnostic laboratory. Such a procedure is full of errors, is unfair to the herd owner and, too frequently, proves very embarrassing to the practitioner.

Throughout the entire hog belt, both State and Federal officials use many employees as consultant veterinarians on swine diseases. Entirely too many such employees are not properly trained on the diagnosis of swine diseases. Apparently most such employees take the course of least resistance and diagnose almost everything they see as hog cholera, regardless of what the true condition might be. This is not sound, scientific, swine disease control.

Laboratories, state experiment stations, federal and state offices should not attempt this disease control work unless each has ample funds to employ a trained, competent consulting veterinarian to visit the herds in question, get a complete history, secure such specimens as seem advisable, return to the laboratory to complete or confirm his field findings, and cooperate fully with the veterinarian who is responsible for the maintenance of the health of his client's herd.

Dissemination of Disease

As a practicing veterinarian and one vitally interested in the livestock industry, I feel compelled to say something relative to the extreme lack of any systematic control over the spread of contagious and infectious diseases of livestock, particularly swine, which is the subject involved.

The result of the recent general election indicates, among other things, that in general, the agricultural interests in the swine production states, will have a large representation in the several legislatures. They are, therefore, in a position to at least attempt to correct their livestock disease programs. Any livestock disease program that does not take efficient veterinary service into consideration is doomed to failure. Likewise, most any program of this nature in any state, operating under a lax political enforcement, cannot be effective.

Perhaps laws are not needed. Regulations may be sufficient. We seem to have regulations at the present time governing almost everything that is done with the exception of regulations on the control of disseminating swine (or livestock) diseases.

Never was there a time in history, with the entire world clamoring for more and more food producing animals, a greater need for effective regulations, wisely and fearlessly enforced, governing the sale, transportation and exchange of live animals and poultry. To be successful, livestock health departments of the several states should be placed under civil service. They should be manned by efficient and fearless executives, regardless of their political preferment, provided with ample funds to employ an intelligent and efficient staff who are capable and willing to discharge their duties.

Traders of livestock, sales barns, stock yards and other places used for the common exchange of livestock are primary sources for the dissemination of contagious and infectious diseases. Innocent and unsuspecting persons are often victims of these unsupervised centers. Disease is spread; unwarranted losses occur — both nullifying the efforts being put forth by the livestock producer, the veterinarian, and the subsidiary interests in their effort to conserve and produce an ample food supply for our war effort.

Canine Distemper

By JAMES E. GREENE
Auburn, Alabama

DISTEMPER of dogs like influenza of the human family (to which it is closely related etiologically) is an acute infective disease caused by a filterable virus, but nearly always it is complicated by numerous secondary invaders, e.g., *Salmonella enteriditis, Brucella bronchiseptica,* various staphylococci and streptococcus cerebritis.

Incidence.—Distemper occurs throughout the world, being found even in isolated islands such as Iceland and Greenland. Very few susceptible dogs reach one year of age without having contracted the disease. It is most common at seven months of age, least common after two years of age and practically unknown in suckling pups. Unconfirmed diagnoses have been reported in dogs up to nine years of age.

Etiology.—Carré, in 1905, discovered that this disease is caused by a filterable virus. His work has been confirmed by Lignieres, Puntoni, Sansonetti, Lebrailly, Laidlaw and Dunkin and others.

Pathogenicity.—Carré found that the intramuscular injection of two drops of infected nasal secretion into puppies two weeks of age will kill them in six to seven days after the onset of symptoms; the only post-mortem lesions being an effusion of serous fluid into the pericardium. In older dogs, injections of pericardial fluid produces symptoms in three to four days manifested by a rise in temperature, conjunctival catarrh, purulent rhinitis, cough and, after eight to ten days, abdominal pustules. The post-mortem lesions include catarrhal pneumonia, punctiform hemorrhages, yellow maculae on the myocardium and serous effusion in the pericardial, pleural and peritoneal cavities. In chronic-cases this fluid was only occasionally virulent. The blood is infective at the onset of the fever, while later blood, nasal discharge and lung secretion—all usually fail to produce the disease. This phenomenon gives rise to the contention, often advanced, that the virus is not responsible for the severe symptoms which occur late in the disease. The fact that homologous immune serum is not effective in the later stages, adds additional credence to this view. In transmissibility experiments, Puntoni transmitted the disease by intracerebral inoculation of the brain tissue, and Robin and Vechiu accomplished transmission with cerebro-spinal fluid. Bile, peritoneal fluid and extracts from the various organs have also been found to transmit the disease.

Although the virus is very delicate when cultivated artificially, it seems to have a high degree of natural resistance. It is not always destroyed by drying at room temperature. It maintains its virulence longest when frozen.

Transmission.—Distemper is transmitted directly by ingestion of food or water contaminated with mucous secretions from infected animals, by "getting acquainted" or other means of direct contact. Frequently, infections have been traced to contact with articles contaminated by urine from infected animals.

Indirect transmission has often been traced to contact with contaminated parts

of the body or articles of clothing of an attendant or other persons who have handled infected animals recently. The possibility that the virus may be air borne and insect borne must not be dismissed lightly. Although Hutyra and Marek quote them to the contrary, Laidlaw and Dunkin stated that on two occasions the disease made its way between pens which were separated by a space of 12 to 15 meters. C. A. Cary contended that flies and mosquitoes are very definitely involved in the transmission of canine distemper.

Anatomical Changes.—In the small number of cases which succumb to virus septicemia without complications, the only changes found at necropsy are serous exudation into the pericardium, small hemorrhagic effusions of the myocardium and catarrhal inflammation of the mucous membranes.

However, in the usual complicated forms of distemper in dogs, the lesions are more extensive and may include:

I. Pulmonary
   a. Ecchymotic hemorrhages over most of the visceral pleura.
   b. Purulent plugs in the bronchioles.
   c. Areas of atelectasis, especially at the borders of the lungs.
   d. Fibrinous pleuritis.

II. Gastro-Intestinal
   a. Catarrhal gastroenteritis.
   b. Occasional ulceration of the gastric or intestinal mucosa.

III. Nervous System
   a. Macroscopically visible hemorrhages in pia-arachnoid.
   b. Infiltration of glia cells.
   c. Vacuolization and chromatolysis of superficial cells of the cerebral cortex.
   d. Hyperplasia and hypertophy of Purkinje and stellate cells of the cerebellum.

IV. Miscellaneous
   a. Inflammation of the thoracic and mesenteric lymph nodes.
   b. Petechial myocarditis.
   c. Parenchymatons degeneration of the liver and kidneys.

Pathogenesis.—Distemper has been classified as being of four types; namely, skin, intestinal, pulmonary and nervous. However, it is common knowledge that the distemper virus causes a septicemia which, in itself, may sometimes be fatal, but this stage of septicemia is usually followed by a secondary invasion of bacteria which may produce the symptoms of any one or more of the above types.

The significance of abdominal pustules in canine distemper is questionable, notwithstanding some have considered them to be pathognomic. It has been our experience that they are of minor diagnostic importance because of their inconstant appearance. However, some investigators have

Very few susceptible dogs reach one year of age without having contracted the disease

reported transmission of the disease with material from these lesions. Trasbot and Luhrs produced pustules, slight conjunctivitis and rhinitis, but no severe symptoms, by the subcutaneous injection of the contents of pustules. Luhrs regards the pustules as a form of herpes associated with inflammatory changes in the gray matter of the spinal cord, and as probably being analogous to Levaditi's neurotropic ectodermatosis.

Symptoms.—The incubation period is usually three to five days. However, there have been reports of periods varying from two days to two and one-half weeks.

The peracute form is manifested by anorexia, lassitude, pyrexia and melancholia.

Preceding death, which may occur in two to three days, the temperature falls below normal and the animal dies in coma.

The acute form begins with fever 104 to

In the acute form there are respiratory, digestive and nervous symptoms

106°F. reaching its peak in about five to seven days and beginning to drop to nearly normal about the 7th to 9th or 10th days when it begins to rise again. Throughout the remaining course of the disease the temperature chart is very irregular.

At the onset, animals become languid, the hair coat rough and anorexia develops. Usually rhinitis begins in one to two days after the first fever, as shown by sneezing, rubbing the nose with the forepaws and a nasal discharge, which is, at first, serous but later becomes purulent and finally may be streaked with blood.

Catarrh of the respiratory tract, purulent conjunctivitis and photophobia develop almost simultaneously with the rhinitis, as manifested by a short, soft, spasmodic cough, dry or moist rales and dyspnea. In some instances, interstitial keratitis and staphyloma occur.

Digestive symptoms begin early, as shown by anorexia, emesis, constipation and later diarrhea, extreme thirst, dehydration, coating and sometimes ulceration of the tongue.

Nervous symptoms may begin with the other initial symptoms or occur as late as the fifth or sixth week. They occur as chorea-like spasms of the muscles controlling the lips, alae nasi, cheeks, ears, fore or hind limbs or they may be in any group of skeletal muscles. Where nervous symptoms develop early in the attack they are often manifested by epileptiform convulsions which may terminate in death in a few hours. In less acute and violent cases paresis usually begins in the hind limbs and progresses forward. Death occurs when any group of vital muscles is affected by the paralysis.

Some cases of distemper are affected by an exanthema which begins as small papules or pustules that later become encrusted and emit a repulsive odor. The urine may contain bile pigment, indican, acetone and albumen. There is an increase in polymorphonuclear leucocytes and a decrease in lymphocytes.

Course.—Ten days to six weeks.

Predisposition.—Exposure, intestinal parasites, inbreeding, malnutrition, unhygienic conditions.

Prognosis.—The mortality depends much upon the age and previous nutrition of the dog but averages about 60%.

Inclusion bodies.—These bodies are apparently colonies of virus or possibly products of degeneration resulting from virus invasion. They are found in all respiratory epithelium and in conjunctiva, urinary bladder, spinal nerve cells, Ammon's Horn and Purkinje cells. They are intracellular, extra nuclear, structureless and contain vacuoles. They stain with carbol fuchsin but not with nigrosin.

Differential Diagnosis.—Since the usual symptoms of complicated distemper are so nearly identical with those of coccidiosis, considerable care should be taken in differentiating these two conditions. The oocysts can be identified easily by laboratory examination of the feces. However, there is the possibility that both distemper and coccidosis may occur simultaneously. In areas where leptospirosis is endemic this disease must be considered in the diagnosis of distemper. However, an antigen agglutination test will usually facilitate the differentiation of these two conditions. There is also a possibility of confusing symptoms of severe hookworm infestation with early symptoms of distemper. The fact that fever does not predominate in ancylostomiasis is of differential significance.

Immunization.—Active Immunization: One attack of distemper confers permanent

immunity. Few animals reach the age of one year without contact with the virus.

Although the principles involved in producing immunity artificially are essentially the same, many variations in technic are in general use. The Laidlaw-Dunkin method employs formalized spleen tissue vaccine followed by the injection of live virus. However, many practitioners, who use this vaccine, routinely, use repeated doses of vaccine and omit the virus.

The Lockhart method is similar to that used in hog cholera immunization in that immune serum and virus (unmodified) are injected either simultaneously or consecutively.

Green, Carlson and Swale make use of a virus which has been modified by many serial passages through ferrets.

Much has been written concerning the comparative efficiency and safety of the various methods. At present, however, all three of these methods are widely used.

Passive Immunity: Lockhart, Ray and Barbee in 1925 introduced an immune serum from animals hyperimmunized against distemper. Immune serum is now widely used to afford temporary protection. It is used prophylactically for the short time protection of susceptible animals while patients in veterinary hospitals and while participating in dog shows, where it is assumed that exposures may occur. It is used therapeutically in treating the early or virus stage of the disease with varying degrees of success, according to reports.

Treatment.—One and one-half to 3cc of antidistemper serum per pound of body weight is usually considered an adequate dose. Two-thirds of this serum should be given intravenously and the remainder subcutaneously. This treatment should be repeated the following day—giving only one-half as much serum. Mixed infection serum should be given on the following three days. This treatment may be supplemented with vitamin concentrates and Fowler's solution or any good arsenical.

Dehydration should be combated by intravenous infusions and the use of adrenal cortex extract.

Secondary infections may be treated with one of the sulfonamides.

The digestive symptoms may be allayed with the various bismuth or kaolin compounds and paregoric. Pneumonia jackets over a mild counter-irritant should be applied. Cotton and wool babies' undershirts serve this purpose excellently.

Barbiturates should be given to relieve nervous symptoms if they occur.

Ophthalmic ointments and nasal solutions should be used as a supplemental treatment.

Since nutrition is the major consideration, a mixture of eggs, milk, sugar and whiskey given *via* stomach tube several times daily is very beneficial.

Proper elimination must be maintained at all times.

In view of the diversity of treatments which are presently in use, one may conclude that no entirely satisfactory method has yet been developed.

Feeding Turkeys*

By H. C. KRANDEL
Pennsylvania State College

SUCCESSFUL feeding of turkeys requires neither particular magic nor unusual ability. Success in turkey raising depends primarily on a thorough understanding of the principles and practices to be employed.

Blackhead was the chief cause attributed to the decline in turkey production in the United States from 1890 to 1920. This perhaps was partially true but certainly previous to 1929 we had little knowledge of the fundamental principles involved in turkey nutrition. Early literature pointed out that if one was to be successful in raising turkeys, Johnny cake, clabbered milk, onion tops or some magically prepared feed must be provided.

Protein Requirements

Experimental projects in turkey production were set up at the Pennsylvania State College in 1929 to determine the protein requirements of all ages of turkeys. The turkeys were fed a 19% protein chicken mash and given access to all the liquid milk which they would consume. A record was kept of total feed intake including liquid milk which was transferred later to a dry basis. Results showed that a good turkey starter mash should contain approximately 24% protein and the grower and developer mash should have a protein content of approximately 20%. With free choice feeding of grain and mash from 12 weeks to maturity, the protein content of the total ration, during this period, was reduced to approximately 16%.

The chief sources of animal protein feeds are milk, meat scraps and fish meal. The pre-war ration, therefore, contained, in 1000 pounds, 100 pounds of dried milk; 150 pounds of meat scraps and 100 pounds of fish meal. This ration was used for a number of years with very satisfactory results. In 1933, experiments were conducted in the use of vegetable proteins, chiefly from soybean oil meal and corn gluten meal, to replace a part of the animal protein feeds. Satisfactory growth resulted when ½ to ⅔ of the total animal protein in the ration was replaced by an equal amount from soybean oil meal or corn gluten meal and the calcium and phosphorus losses properly compensated. At that time, it was considered that 14% soybean oil meal could replace an equivalent amount of animal protein in the 24% turkey starter mash. Under present conditions, this replacement seems puny. In the turkey starter now used, 32% soybean oil meal and 8% animal protein feeds are recommended.

Vitamin Requirements of Turkeys

Vitamin requirements of turkeys are shown in Table I. Unless proper recognition is given to the vitamin requirements of all turkeys, serious deficiencies may result.

Of fundamental importance in the feeding of turkeys is a clean table cloth and

*Address given before Third Nutrition Conference for Veterinarians, Central Soya Company, Sunset Park, Decatur, Ind., July 7, 1943.

TABLE I—REQUIREMENTS OF SOME ESSENTIAL NUTRIENTS IN RATIONS FOR TURKEYS FOR 1943

Age	% Protein	% Calcium	% Phosphorus	U.S.P. Units Vitamin A Per Pound	A.O.A.C. Units Vitamin D Per Pound	Micrograms Riboflavin* Per Pound
To 8 weeks	25	1.3	0.8	3,650 (800 units per) (100 grams)	900 (200 units per) (100 grams)	1,600 (350 units per) (100 grams)
8 to 12 weeks	21	Probably same as above	Probably same as above	Probably less than to 8 weeks	Probably less than to 8 weeks	Probably not more than 1,000. (220 units per) (100 grams)
12 to 24 weeks	18	Probably same as above	Probably same as above	Probably less than from 8 to 12 weeks	Probably less than from 8 to 12 weeks	Probably not more than 700. (150 units per) (100 grams)
Breeding Stock	16	2.2	0.8	4,700 (1040 units per) (100 grams)	900 (200 units per) (100 grams)	1,450 (320 units per) (100 grams)

*Probably near minimum.

TABLE II—MASH MIXTURES DESIGNED TO CONSERVE VITAL ANIMAL PROTEIN FEEDS AND REPLACE MIXTURES RECOMMENDED PREVIOUSLY

Pounds ingredients	Turkey Starter	Turkey Grower	Turkey Breeder
Ground yellow corn	157.5	211.5	120
Wheat bran	100	150	100
Wheat middlings	100	150	100
Ground heavy oats	100	100	100
Alfalfa meal	75	75	75
Meat scraps or fish meal (50% protein)	37.5	37.5	75
Dried whey or dried milk	50	25	50
Soybean oil meal	320	200	280
Dried brewers' yeast or riboflavin concentrate	30	20	50
Ground limestone or ground oyster shell	20	15	20
Steamed bone meal or dicalcium phosphate	—	10	10
Iodized salt	5	5	10
400 A. O. A. C. Unit Vitamin D—1000 U. S. P. unit vitamin A oil	5	—	10
D-activated animal sterol—1000 A. O. A. C. unit vitamin D	—	1	—
Anhydrous manganese sulphate	2 oz.	—	2 oz.
Total	1000	1000	1000

napkin at every meal. An effort should be made to start the poults to eat early. Placing hoppers in a light place in the brooder house makes it easier for the poults to find the feed. If electric hovers are used in brooding, it is desirable to place the feed hoppers under the hover so that the poults may have easy access to the feed. Colored marbles in the mash hoppers will attract the attention of poults so that they will start to eat.

Plenty of hopper space should be provided to permit at least one-half of the poults to eat at one time. An open type of container is preferable for then the poults do not have to push their heads against bars or other obstructions. Later as the poults develop they often form the habit of wiping their beaks on the feathers of other turkeys. Wires stretched across the hoppers provide a means for the turkeys to clean their beaks and thus reduces the trouble from feather picking. Later in the fall, turkeys often exhibit a feather eating habit but this can be corrected by liberally feeding whole oats, barley or legume hay.

Sanitation is important in turkey feeding. Over-filling the hoppers and the use of an insanitary type of hopper results in a tremendous loss of feed. The hoppers should be placed on wire frames which will prevent the poults from eating feed which has been spilled from the hoppers. Similarly, water fountains should be so arranged as to keep the poults away from damp areas. Hoppers and fountains on range should be moved frequently to clean areas.

TABLE III—A SATISFACTORY PERMANENT PASTURE

Seed mixture	Pounds per acre	
Kentucky bluegrass	6	For permanence and resistance to wear
Perennial ryegrass*	10	For quick growth and resistance to wear
Canada bluegrass	4	For dry slopes
Red top	2	For quick growth and reliability on almost any situation
Ladino clover	2	For permanence and succulence
White clover (Louisiana, New Zealand, or Corn Belt)	1	For permanence and close picking
Orchard grass	5	
Alfalfa seed	5	
Total	35	

*Domestic ryegrass may be substituted if desired.

War Rations for Turkeys

Today, the turkey grower is faced with a serious problem in nutrition. Certain feeds are difficult to purchase. Formulas are being changed constantly to meet present feed shortages. Vitamin deficiencies are common and mortality may be greater than normal. As a basis for war-time feeding of turkeys, the following rations are suggested. These rations have given good results throughout the present growing and breeding season. Mortality in 2,470 poults, varying in age from 4½ months to two weeks has been slightly less than 5%.

During the present emergency, the use of a good pasture will be of material aid in the conservation of feed and the economical production of turkey meat. The above permanent pasture for Pennsylvania conditions has given good results.

Satisfactory hatchability of turkey eggs is dependent upon the efficient use of artificial illumination, fundamentally sound and practical nutrition, and proper management. Work at the Pennsylvania State

College has shown definitely that hen turkeys lay well before the males will fertilize the eggs. When both hens and toms were lighted, the hens at the end of the 3rd, 4th and 5th weeks were in very good laying condition, while the males showed no development of motile sperm before the fourth week. By the end of the 5th week, the males showed a high state of production of motile sperm. So in practice we have found it desirable to use artificial lights with the toms four weeks in advance of the time when fertile eggs are desired. From March 30 to June 22 this year, 32 breeding hens produced an average of 62½ poults each. This could not have been accomplished without satisfactory management and nutrition.

Future Feeding Problems

During the past two weeks, the speaker with two other men made a survey of the feed situation covering more than 3000 miles in the states of Indiana, Illinois, Missouri, Kansas, Nebraska and Iowa. A summary of their findings follows:

A. *Corn.*—Less corn in cribs on farms and in local elevators than normal. The only supplies of corn visible were in Iowa and northern Illinois. The growing corn crop in Nebraska, Iowa and northern Illinois is normal. Other areas 60 to 80% of a normal crop.

B. *Wheat.*—The main wheat producing states of Kansas and Nebraska reported 90 and 100%, respectively, of a normal crop. Other states were sub-normal.

C. *Oats.*—The oat crop in Ohio and Indiana was sub-normal but in all other states was normal or above.

D. *Soybeans.*—In the heavy soybean areas, a large acreage was planted but due to excessive rains the planting extended over a six weeks' period. Many farmers were plowing and planting beans the last week in June.

E. *Hay and Pasture.*—In all states, the hay prospects were good and pasture excellent.

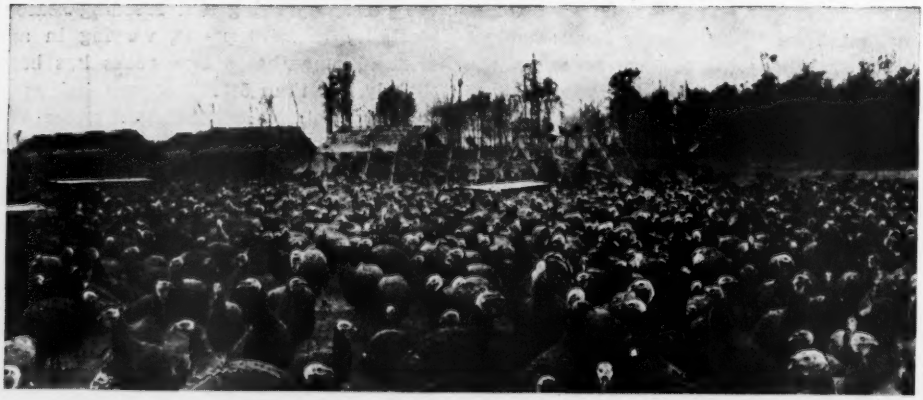
F. *Hogs.*—In all states, an increase in hog population was reported varying from 15 to 52%.

G. *Cattle.*—Nebraska, Iowa and northern Illinois had large numbers of high quality cattle on pasture and in dry lot.

H. *Poultry.*—All states showed a substantial increase in the number of chickens on farms. Turkey flocks were not substantially increased because of the inability to purchase poults.

It is apparent that there is not sufficient grain in sight to feed the huge numbers of livestock now on farms. Sharp reductions in the number of livestock on farms seem imminent.

If the turkey is to survive against the hog, dairy cow and beef cattle, economical production is essential. Of first consideration today to this nation and allied nations is food. It is quite likely that the American people will be forced to turn to a cereal diet because greater efficiency will result in the feeding of cereals direct to humans rather than through animals. Satisfying the palate is no longer of any consideration during the present emergency. With the short grain crops showing up in the mid-west and with over 400,000,000 people to feed in our own and conquered countries to which we have pledged aid, our problem of supplying feed becomes acute. No branch of livestock, whatever it may be, should be given preference over any other except on one principle; namely, the most economical production of food.



Animal Husbandry in India*

By SIR ARTHUR OLVER
Edinburgh, Scotland

RELIGIOUS and traditional prejudices and customs of people of India have been to some extent responsible for the lack of development of animal industry along modern lines. The cow as a semi-sacred animal was not to be slaughtered and even now Orthodox Jains will not knowingly take life in any form. In some parts of India, until comparatively recently, owners of stock were not willing to have their stock castrated, particularly at an early age, though under the village system of management, males and females were permitted to run together on village grazing grounds. The idea was gradually given up and the number of bulls castrated by official veterinary departments has increased until now it amounts to more than a million per year.

There has been a tendency to devote land almost exclusively to cash-crop production without provision for livestock to preserve fertility of the land and to provide labor and also a better diet for the people.

A custom which is universal throughout India consists of burning for fuel most of the solid droppings of cattle. This custom not only deprives the soil of the fertilizer value of the material but also of humus which helps keep the soil in good condition for cultivation and aids in the conservation of moisture. However, since there is a distinct deficit of firewood or other fuel a plan to save this fertilizer has yet to be evolved.

With regard to the raising of dual purpose stock, experience with the short-horn breed has shown that in the hands of the most expert breeders little success was achieved in the attempt to produce such an animal—one which would supply an efficient production of milk (later meat) and at the same time have a high working capacity. So a plan is being promulgated to breed specifically for high efficiency for each need. Striking improvements have been made in several experimental herds.

However, I think India in the future will use a general utility animal which is in practice a dual purpose animal to some extent, that is to say, in the villages the cultivators will breed working type animals which will produce a certain amount of milk but not sufficient to interfere with working capacity.

It is common custom to collect damp dung from cow pastures and plaster them on a surface to dry for fuel

Although the she-buffalo is usually more highly fed and is generally considered to be a far more efficient milk and butter fat producer than the cow, a careful analysis of available data showed that this is probably only true where an abundance of coarse grazing is available. Indeed, strictly

*Animal Husbandry in India, 1943. Excerpts from paper read before the Royal Society of Arts by Col. Sir Olver, Principal, Royal (Dick) Veterinary College, Edinburgh; former Animal Husbandry Expert to the Government of India. *Indian Vet. Jnl.*, 19:4, pp. 167-193.

assessed in relation to the relatively high value in nutrition of the solids-not-fat of milk and with due regard to the need for a correctly balanced diet for the people, it is probable that for home production the balance would favor cows of the best Indian milk breeds. Under parallel conditions of feeding and management such cows produce as much milk as, or more than, buffaloes, and though the percentage of butter

Indian bullocks (young Zebus) extracting oil from peanuts in a native oil press. The Zebu is used chiefly as a daught animal

fat is lower, the Zebu cow is highly efficient in converting dry crop residues into food of high biological value, and can even produce butter fat as cheaply as the buffalo. For commercial dairying the buffalo has obvious advantages, but it is difficult to feel that the custom of maintaining she-buffaloes for milk production as well as cows for the production of working bullocks can be economically sound in rural areas.

Female buffalo calves are usually well fed and reared, while most of the males are allowed to succumb. In the case of cows the opposite happens, and in both species it is the custom to present the stuffed hides to the cows at milking time to induce them to give their milk. In recent years it has, however, been shown that with proper handling when first brought into the milking herd, Indian cows yield their milk perfectly well without this, and that early maturity can readily be induced. It seems it would be sounder to use cows and feed them and the male and female calves properly, instead of maintaining buffaloes as domestic milk producers and cows to provide the essential supply of work cattle.

Though the Mukteswar Research Institute has long been established and has achieved world reputation, there has been a great lack of liaison between it and provinces and states in regard to systematic investigation of disease among livestock and animal industry problems in general. For some time there was an interference with the development of such institutes when they were required to cover their expenses by the sale of biological products. Later the ruling was rescinded and, although an advantage to research, it seems unlikely that the annual production of rinderpest serum made at Mukteswar, which at the time exceeded 70 million doses, will ever be as great again. However, there has been a widespread substitution of vaccination with goat virus, either alone or along with bull virus, consequently not so much serum is required. Considerable of what is needed is being made at other places.

Probably the most valuable contribution to the livestock industry has been the development by J. T. Edwards, while he was director of the Institute, of a vaccine prepared from the blood (later from the tissues) of goats infected with a rinderpest virus of fixed and reduced virulence for the bovine. This tissue vaccine remains active longer than that made from the goat's blood. Since 1,000 doses of vaccine can be prepared from one goat (which is of small monetary value) the cost of the vaccine is negligible and as a consequence it can be and is used freely.

In some provinces large scale protecting inoculation has been undertaken, especially at the frontier, of the great droves of dealers' cattle which pass through these places. This annual transit of millions of such cattle from the north to the south of India is a serious complicating factor as regards disease control as well as in the breeding of cattle. In the almost total absence of veterinary practitioners the control of dis-

ease and the treatment of animals owned by all classes is dealt with throughout India by provincial and State veterinary departments composed of fully qualified veterinary surgeons (European and Indian) and veterinary assistants trained at the Indian veterinary colleges. But I think it can fairly

Demonstrating the use of "Burddizzo's Castrator" to a group of Indian students. No incision is made in the scrotum. The spermatic cord only is severed by pressure. It is an improvement over the native "mulling"

be said that, owing very largely to Government neglect, there is no other country in which livestock has such tremendous importance or in which so little has been done for veterinary education. Veterinary facilities are still not available for adequate practical instruction.

Rinderpest and Theileriasis

On account of the peculiar conditions in India, the rinderpest problem seems to be in a fair way to solution. The Zebu cattle have a large degree of basic immunity, probably the result of having had to combat periodic waves of rinderpest infection for untold ages. Another common disease of cattle in India is Theileriasis, caused by the piroplasma, *Theileria mutans*. This disease has militated against the acclimatation of imported stock brought into India. Such animals almost inevitably contract the infection. The native cattle, having become infected soon after birth (at an age when relatively resistant) develop a large degree of Immunity. It is therefore unwise to import cattle into India with the object of improving native stock.—*Dr. J. T. Edwards*, former Director of Mukteswar Research Institute.

Veterinary Service in India

The work of the veterinarian in India differs from the work of veterinarians in western countries. In large cities as Calcutta and Bombay, many are engaged in private practice. All other veterinarians in India are in the government employ and their services are available, without charge, to anybody and everybody. In the main the natives do not invite the aid of the government veterinarians although the services are free; preferring the native quacks who use only native herbs for medicine.

The veterinarian in India is largely concerned with infectious diseases of cattle, such as rinderpest and foot-and-mouth disease. In northern India he also treats camels for surra. In the south and eastern parts, elephants provide additional work. In treating elephants the mahout is indispensable to the veterinarian as restraint is a difficult and time-consuming task.

The equipment of veterinarians in India is much like that in other countries except that for treating camels much use is made of long, strong ropes and for elephants chains are used.

All manner of veterinary instruments are manufactured in India, but veterinarians in private practice use exclusively imported instruments. Practically all pharmaceutical and biological products used by the government veterinarians, too, are produced in India.

Practically all towns of 5000 or more population have a resident veterinarian in government employ. Smaller communities must depend upon district veterinarians, also in government employ. With few exceptions the veterinarians are Indians who were trained in India. The Maharajahs have gone in for dogs and polo ponies and many employ their own veterinarians.

However, the veterinary profession is as yet held in little esteem by the natives, who are conservative to the nth degree; reposing their faith mainly in their herbal medicines. When modern treatment fails, as of course it does sometimes, the "news" spreads far and wide in no time.—*Walter Buchler*, London.

Facts Regarding Goats*

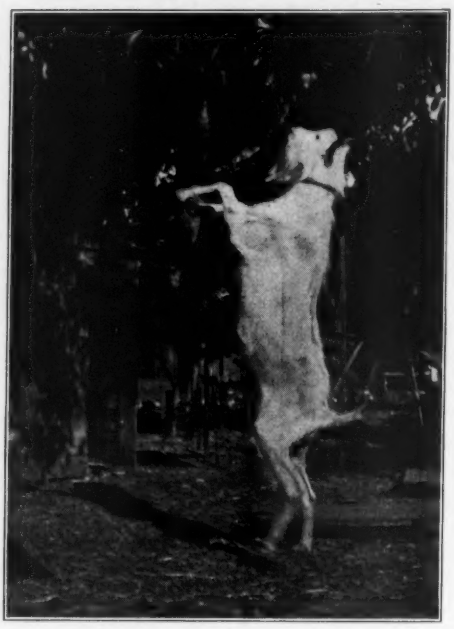
By PROF. J. C. MARQUARDT**
Geneva, New York

RECENT excavation in Europe revealed that the goat was associated with men of the stone-age. Praises for the goat have come from many pagan leaders, and the Bible contains more than 140 goat references. It is not difficult to understand, therefore, why goats and dogs share the honors of being more widely distributed than any of the other domesticated animals.

Today there are nearly three times as many cows in the world as goats. A cow produces more milk than eight goats. However, more people drink goat's than cow's milk. This is clarified when it is realized that British India contains 25% of the world's goat population, and altogether Asia has 50% of the goats in the world. Ten per cent of the goats are in North America. South America has a comparable number. Europe has a goat population equal to the combined numbers in North and South America. Africa has as many goats as Europe.

New York State alone has a $2,000,000,000.00 Dairy Industry. Reliable state statistics on the goat industry are not available, but it is a safe calculation that for every $1,000.00 worth of cow's milk retailed in the state the goat dairies sell less than $1.00 worth of milk. This should not discourage the goat breeders as the dairy industry with its numerous appendages is the largest industry in the United States. It has been estimated that the annual retail value of goat's milk produced in the United States is more than $250,000,000.00. This constitutes a great enterprise in spite of its relative smallness when compared to the dairy industry.

It is always proper to bring to your attention the fact that goat breeders list among their number some of our country's leading industrialists, legislators, writers, farmers, and members of the clergy, legal and medical professions. More important, however, is the large number of persons with low incomes who understand better than others the happiness and comfort which their goats afford. Missionaries are especially interested in goats. This interest is always manifested at the annual goat meeting for missionaries held at Cornell. During the past few years the attendance has always exceeded fifty. These men present interesting facts about goats throughout the world besides receiving information concerning goat husbandry.



The Saanen goat was imported in 1904. The buck pictured is 14 months of age, weighs 170 pounds and stands 6½ feet

The best goats in England give three times as much milk as our best goats. The same ratio holds for average goats. Testing goats for production and proving a few bucks is a task for the breeders. The Colleges and the Experiment Stations are always ready to assist in this work.

Goats' milk is often a constituent in infant formulas. In some sections of France babes secure their milk by being allowed

*Reprinted from *Dairy Goat Bulletin*, 1943, 1:1, pp. 5 and 11.

**New York Agriculture Experiment Station, Geneva, New York.

to nurse the goat. Goats' milk is often prescribed in the diet of invalids. The reasons for these benefits derived from this milk are not well known. Until they are better known, the industry should refrain from suggesting reasons which are not acceptable to those with scientific training.

When in her prime this champion Swiss milk goat, owned at the time by Dr. James Chamberlain of Washington, D. C., produced eight quarts of milk daily. It was consumed by tuberculous patients in Washington hospitals

The goat industry in the United States has a future in the breeding of better animals, in the production of quality milk and its products. Other possibilities deserve mentioning. Each normal year we import about 100,000,000 pounds of goat skins from India, China, Brazil, Spain, Argentina. Even Sweden, Canada and France enjoy this market.

More than 15,000,000 pounds of mohair are clipped in Texas, Arizona, California, Oregon and Missouri each year. It would be a worthwhile enterprise to know more about the goat hide and hair industry in our country.

* * * *

The pressing need now is for maximum food production. This should mean putting into effective use the natural ability of goats to use, browse and forage that which would otherwise go to waste. Goats excel in conservation of this kind.—*U. S. Department of Agriculture.*

More Goat Facts*

Goats are prolific and failure to breed is rare. Failure of a doe to conceive after service may be due to impotency in the male, functional sterility or hermaphroditism.

A doe should not be bred until 18 months of age although she can conceive at five months.

The gestation period is about five months —four full calendar months and 25 days.

Cases of kidding where assistance is required are rare but, where needed, scrupulous cleanliness must be observed.

The date of freshening is important, as a doe will have supplied over 60% of her total output during the first four months after parturition.

Sale of goats' milk should be subject to a negative brucellosis test of the lactating animal.

Milk from healthy animals is sweeter and richer in taste than the best cows' milk.

Records of the U. S. Department of Agriculture indicate that a well-bred goat yields 10 times its body weight in milk annually—some even exceed that amount.

Three indications for the use of goats' milk are (1) gastric ulcer (2) malnutrition in infants (3) malnutrition in the aged.

Goats are in their prime at six years but are not considered old for several more years.

Salt should always be available—in form of block or in a box, never with food.

Castration of the male should be done before the kid is two weeks of age—about 10 days is the right time.

Heavy infestation with lice is often the cause of emaciation in the dairy goat.

Of internal parasites stomach worms, intestinal worms and liver flukes are the most common.

Liver flukes are the cause of a pot bellied appearance in the animal. The most reliable remedy for this fluke is a capsule containing 1cc of carbontetrachloride.

Sudden and frequent change of feed is not harmful to the animal. They require lots of roughage and do not thrive on rich, concentrated feeds.

*Excerpts from *The Milking Goat*, 1940, by M. R. Steffen.

Glottidium vesicarium, a Poisonous Plant in the Southwest

H. I. FEATHERLY, E. E. HARNDEN, O. C. DERMER and H. C. SMITH
Stillwater, Oklahoma

THE plant *Glottidium vesicarium* (Jacq.) Harper, variously known as castle bean weed, coffee bean weed and bladder pod, has been increasing rapidly in quantity and extending its range northward in southern and central Oklahoma during the past few years. It was introduced into this country from the West Indies, and has become a noxious weed from the standpoint of the stock grower. It is a freely branching annual of the legume family, with pinnately compound leaves. The yellow, pea-type flowers are usually borne in pairs in the axils of the leaves. The pods, which are about two to two and one-half inches long and pointed at each end, are of a peculiar structure in that they consist of a tough outer hull that splits open and a thin papery inner hull which usually contains two beans. The pods remain on the plant throughout the winter and it is during the winter months that the trouble occurs. The plants grow under a variety of conditions but reach their greatest development in rich moist soils where they may attain a height of 10 to 12 feet.

Each winter, complaints come in from farmers who have lost cattle, supposedly from eating this bean. The consensus among them is that most of the cattle which die from eating the beans are those which have been moved recently from a bean-free pasture to a bean-infested one. Thus it is the new cow in the pasture that is more susceptible than those which regularly graze there.

We were unable to observe any sick animals in the field or to perform a necropsy on any dead ones, but very definite symptoms were described by some of those who had lost cattle.

A quantity of the beans was collected and brought to the Experiment Station at Stillwater for experimental purposes.

Experiment No. 1.—A healthy cow was selected, placed in a stall and fed 500 grams of the hulled beans at a meal. The first feeding was in the afternoon of January 4, 1941. These beans were all eaten. She was given 500 grams more the next morning. A few of these were eaten. Five hundred grams more were added that night. On January 6, she refused to eat any more of the beans. She was kept in the stall with the beans until January 21, when 627 grams of the beans were recovered from the feedbox.

Altogether the cow ate 873 grams without any ill effects. Since the beans did not prove poisonous to the cow, she was fed moldy hulls with the idea that perhaps poisoning was due to moldy hulls. She ate some of them and then refused to eat any more, even when they were mixed with the regular feed. The hulls produced no ill effect, so the cow was released.

Experiment No. 2.—The following September (1941), beans which we had kept over the summer were ground up and fed to another cow. This cow refused to eat them; so we failed to poison the second cow.

In February, 1942, word came from Noble, Oklahoma, that a farmer had lost three cows. He supplied a sample of the beans suspected of poisoning his cows, and they were found to be *Glottidium vesicarium*. The farmer was asked to send in a quantity of beans collected from the pasture in which the cattle died for the purpose of conducting another experiment. Two gunny sacks full of the beans were received in the hull.

Experiment No. 3.—April 11, 1942, one sack of the beans in the pods was fed to a Jersey steer. He consumed approximately four pounds of the beans and pods. No other food was allowed for two days, then the usual amount of grain and prairie hay was fed the animal. He ate very sparingly and appeared somewhat depressed. The pulse and respiration were rapid. The muscles trembled. The hair coat became rough. The animal was constipated, and muscular weakness seemed to be progressive until the animal became paralyzed. The loss of flesh was rapid. After two days the general symptoms were of sudden

*This paper represents a cooperative project conducted by the Oklahoma Agricultural Experiment Station, H. I. Featherly representing the Botany Department, O. C. Dermer the Chemistry Department, H. C. Smith and E. E. Harnden the Veterinary Science Department. It is published by permission of the Director Station.

onset; staggering, prostration, and inability to rise were the prominent symptoms. The animal died April 22.

The symptoms were typical of those described by farmers who had lost cattle from eating the bean. A post-mortem examination showed there was an acute inflammation, almost a hemorrhagic condition, of the mucous membranes of the abomasum and small intestines. The blood vessels supplying these parts were engorged.

Experiment No. 4.—Later, two grams of ground beans were fed to a rabbit, and it died. An adult rabbit was taken away from feed and on April 28 was force-fed two grams of ground beans. This animal died April 29, showing the acute inflammatory condition of the stomach and small intestines. Another rabbit was fed a larger amount of the bean, dry-baked several hours at 110°C., but without ill effect.

Experiment No. 5.—Six grams of the raw material was force-fed to a white Leghorn chicken. It died. A white Leghorn hen, number 92511, was given two grams of ground bean on May 2, 1942. She appeared normal on May 4; the feces was brownish. On May 6 she was given two grams more of the ground bean and on May 7 she was sick. On May 8 at 8 a.m., she was found dead.

Post-mortem findings were: Crop normal, proventriculus lining slightly hyperemic, the muscular portion showing extensive echomotic hemorrhages, the ventriculus (gizzard) lining loose, musculature extremely hyperemic with small echomotic hemorrhages on the suface. The intestines, especially the duodenal loop, were greatly inflamed. All blood vessels supplying the ventriculum and intestines were greatly distended. The kidneys were swollen.

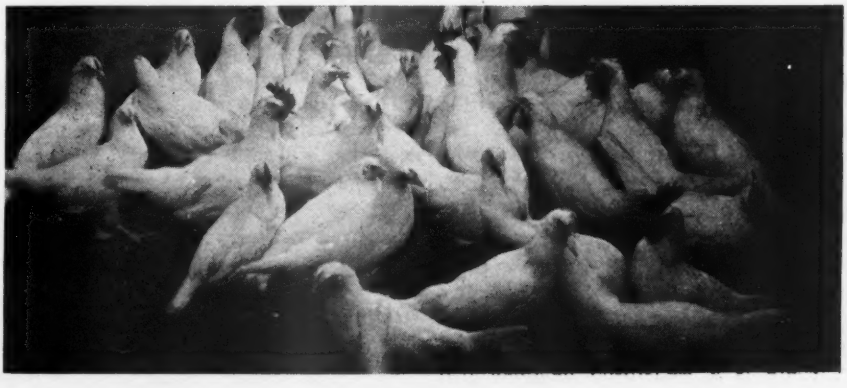
In an effort to concentrate the toxic principle of the beans, they were ground and extracted in a Soxhlet apparatus with hexane.

Experiment No. 6.—May 20, a white Leghorn hen was fed nine grams of the residue from this extraction with no ill effects. On May 27, the same hen was given nine grams of the viscous oil obtained by evaporating the hexane from the extract, and she died in about 36 hours.

Autopsy showed the same conditions as described in hen number 92511, but not so severe. Since this indicated that the poison was extractible, an ether extract and an alcohol extract of the beans were similarly prepared and evaporated.

Experiments Nos. 7 and 8.—May 28 another white Leghorn hen was fasted 12 hours and given the ether-soluble material, but no ill effects were perceptible. The same bird was fed some alcohol-soluble material on June 1, again without producing any symptoms. Then the residues from these extracts were fed, but to our surprise they also proved non-toxic.

After the several chemical fractions proved harmless, we ground some of the original beans which had been used to kill the animals previously and tried to kill a white Leghorn hen with them but were unable to do so. Apparently the bean had lost its toxicity while being stored in the laboratory. This loss of toxicity may account for the fact that other experiment stations working on the bean were unable to find any alkaloids or glucosides in the bean. The symptoms were typically those of alkaloid poisoning, but apparently the poison underwent a chemical change in the bean during storage.



Autobiography of a Veterinary Practitioner

By E. T. BAKER, Moscow, Idaho

XXI

Going Into Practice

AFTER the young veterinarian has passed his final examinations, the following questions confront him:

1. What line of work shall I go into?
2. If in practice, where shall I locate?
3. What equipment shall I need?

The veterinary profession today offers a wide field of activities and, as youth is the proper time to acquire training and experience, he need not jump into practice at once.

The greatest peril confronting the young veterinarian of today is the fast and expensive mode of living. This is not so much the individual's fault, as the present day system of existence, which requires all one makes, and then some. It is difficult for a young man and his wife to live on a more modest scale than their friends or neighbors. For that reason, when one has a check coming in each month he is loathe to give it up for the more precarious receipts of a newly born practice.

In choosing a location, one should look for a place which has enough live stock to support a practitioner, with the owners accustomed to calling expert assistance, and able to pay their bills. As the old man said: "They ain't no use fishin' where they ain't no fish."

In one community, about 50 miles from here, there is a well-to-do neighborhood and small town. It is surrounded by a fertile country, with much live stock and well conducted ranches. Driving through this section, one would naturally conclude it to be a fine place for a general country practice.

However, the parents of most of these people homesteaded in this region before there were any veterinarians available. They had to treat their live stock when ailing and they developed old-fashioned remedies which were handed on from one generation and family to another. Most of these present day farmers have been born, raised, married and live on the "home ranch," and they never think of calling a veterinarian for anything. If the patient happens to live it is due to their wonderful skill, if it dies it is an act of God. Half a dozen competent men have located there one after another in the past 25 years, but they have moved away, for the practice there is just nicely adequate for the support of a cigar-store Indian in the manner to which he is accustomed.

In another community, about 20 miles away, a practitioner has lived and prospered. His people call him as a matter of course. They depend on him like our parents trusted the old time family physician. That is what we mean by "good" and "poor" locations.

Acquiring a Practice

A practice may be acquired in one of the following ways:

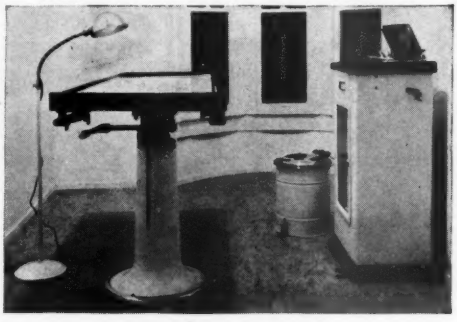
1. By locating in a town where there is no practitioner. This may be termed "developing a new field." That is getting it the hard way.

2. By locating where there is already another veterinarian. If the latter is competent and well liked, and there is not enough work for two men, this may be considered as an "uphill proposition." The new man will be given the privilege of "doctoring" for all the deadbeats and slow-

pay owners, and will be kept quite busy at first. Later on, when he tries to collect his bills, he will be still busier, then wake up.

3. By purchasing an established practice from a man who wishes to retire, or from the estate of a deceased veterinarian. If the practitioner who wishes to retire has made a success of the business, it will usually be a good investment. If, on the contrary, the present owner is disgusted with collections and the type of work, why do you think you will do any better?

4. By entering into a partnership with another man or old friend. This is one of



If you can take over the practice of an old fellow who wants to quit and has nothing but equipment to sell you practically inherit it

the best ways to "bust up" a beautiful friendship, and is one of the last types of work we would engage in.

5. By entering the business as an assistant to an older man who wishes to retire in the near future. This is often one of the best opportunities for a young man, for it offers a splendid post-graduate course in conducting a practice. He will learn many things not taught in colleges or mentioned in text books. This training will prove invaluable to him throughout his entire career.

6. By taking over the practice of an old and well fixed veterinarian who wishes to quit and has nothing to sell but some equipment. This is almost like inheriting the business.

7. By making a contract with some farm bureau to care for a number of animals at a specified contract scale of prices. This is socialized veterinary medicine, and in the future, when all agriculture is regimented, and the farmers are paid so much for not planting crops, perhaps the veterinarian will be paid for not making calls. This would be better than not being paid for making calls, when you run into clients like the Scotchman whose doctor told him the bill was $3.50—a dollar and a half for the medicine, and two dollars for the call, and who replied: "Well, Doc, here's a dollar and a half; I'll return the call some time."

The Minimum Equipment

As to equipment, one can begin on a modest scale and gradually add the instruments and other requirements as needed. A small, compact supply of well made instruments, supplies, medicines and biologics will be found more useful than a cumbersome outfit of everything a high pressure salesman has slipped on the unsuspecting novice. We might add that a pair of good arms and hands; professional judgment and a trace of brains, combined with a pleasing personality, will be found useful in a general practice.

Another pitfall to avoid is the "joining" of every club, lodge and other organization in the town. We could belong to practically every outfit in our town but the Mother's Club, and we could be so busy attending to other people's business we would have no time for our own. Of course, if one is a "natural-born jiner," and likes to be a leading citizen, that is his God-given right as a free and independent American.

Inescapable Expenses

Expenses will be found fairly high in practice, and one should figure on the net income instead of the gross. Years ago we made the astounding discovery that saving five dollars was equal to making that amount. We also learned that what we made was immaterial as compared with what we collected. We are publishing these amazing discoveries for the first time, for the benefit of humanity in general and the veterinary profession in particular. Perhaps we will be given a leather medal for these scientific researches into the realm of everyday economics—who knows?

Fees vary greatly in different sections, as well as do the methods of collections. No

two practices are alike, and no set rules can be laid down for conducting all of them. The practitioner becomes a rugged individualist and being one ourself, we respect the other fellows' ideas along this line.

The Human Side of Practice

Practice teaches one to be human and kind and sympathetic. The country practitioner sees so much of life and the human element that he becomes tolerant and mellow. He sees poverty and riches, prosperity and depression, and cases die that should get well, and *vice versa*.

There is nothing prosaic or routine about practice. While we have been writing this article, or trying to, we have treated a little fox terrier matron with four puppies for eclampsia; we made a hurried trip to see a cow dying with plant poisoning, and a pure-bred Shropshire buck suffering from retention of the urine. Next, we treated a dachshund for strychnine poisoning; replaced a uterine eversion in a cow, and injected a "sweenied" shoulder. Then we inspected the meats at seven markets, and examined 42 carcasses of dressed hogs at the local slaughterhouse. Several farmers called for medicine, one for a sick horse and another for some worm medicine for pigs. We answered nine inquiries for a farm journal, listened to a ball game over the radio, and finally got mixed up in a bowling match at the Elks club.

Having lived and practiced in this community for 32 years, I have seen a cross section of American life as it has existed for the past three decades. It is much like watching a "movie," for it is a constant procession of birth, life and death, with its inevitable tragedies and comedies.

Not long ago I made a call out to the old Magnuson ranch on Bear Creek, in a very isolated section. Forty-three years ago Martin Magnuson and his bride had come out from "Minnesoty," and had settled on this homestead. With their own efforts they had carved a comfortable home out of the forest and a few years ago when I tested their cattle for Bang's disease they had accumulated enough for their old age. Their family had grown up, scattered, with homes of their own.

Then, one cold night last winter, Martin and his wife, now old and feeble, were suddenly awakened by the sound of crackling flames. The house, so carefully built by Martin in his younger days, was a roaring furnace. They barely escaped in their night clothes.

As the house, which had sheltered them for nearly four decades, crumbled into blackened ruins, old Martin fell forward on his face, a victim of a fatal heart attack.

This spring they had an auction sale, and I was called to vaccinate some calves a few days before. As Mrs. Magnuson and I stood before the charred ruins of the foundation, what memories must have come through her mind, as she made ready to leave the old home forever.

It was the end of an era for one family, so typically American.

An Unsolved Mystery

Adam Diller was 47 when he married a young woman of 18. This usually spells trouble in the best of matrimonial circles. Adam was an old client of mine, and I had a very high regard for him.

The Diller family got along in more or less of an armed neutrality, until Mrs. Diller's father went to heaven, and her mother re-married in several weeks. However, this marriage proved a total failure, and the mother-in-law, in a towering rage, came to live with Adam.

For some reason or other, the quiet ranch now became as lively as Sicily in its more hectic days, and to complicate matters, Mrs. Diller became interested in a young hired man on a neighboring farm. Then, one morning, the entire community was shocked to hear that Adam had "blowed out" his brains with an old bear gun.

After the funeral everything was very quiet for about a month, when the bereaved widow married the hired man, and life went on much the same. Although an investigation was made, nothing out of the ordinary could be discovered.

However, after having known Adam for almost 30 years, I have often wondered what really happened. It is one of the rural tragedies to be found in almost every community.

Human Ailments

An old friend of ours was crippling around with arthritis in both knees. He had just returned from a hot springs sanitarium with little or no improvement. Passing by our house on crutches the other day, he stopped and asked:

"Doc, how'd you handle a critter in my condition?"

"Well, Sam," we replied," on account of you being a good Methodist, we'd first put a twitch on your nose, and pour down a half pint of good whiskey. Then, we'd put a blister on each knee, and turn you loose in a big pasture. By the time you quit running you'd be limber as a kitten."

As long as we have been in practice we have never recommended any particular physician in our town, or any remedy for human ailments. By following this routine we have kept the friendship of our medical friends.

Just last week we met an old client who

was plenty worried. His daughter had just undergone a cesarean operation, which he thought unnecessary. He was going to tell "that there doctor what he thought of him."

We told him how many complications could occur during animal birth, and we supposed the human female was exposed to the same perils. We added he should have confidence in the physician who probably worried more about the case than anyone else. Also, with modern surgery and drugs, the chances for a fatality were very slim. He walked away from me with a different outlook on life.

The more we see of the difficulties encountered by our hard working country physician's, the "gladder" we are that we deal with animals.

We apply the same tactics with our druggists. When a client complains long and loud about "bein' charged three dollars fer jest a few pills," we tell him perhaps they are expensive, and the druggist may have made less profit on them than he thinks.

If Hitler had built up instead of tearing down, he might have been able to sleep more soundly these hectic nights.

Helpful Friends

Early last spring Andy Larsen had a mild stroke of paralysis. Both his boys were in the army. Without saying anything, Andy's neighbors banded together and plowed his fields; planted his crops; made his wood; harvested his hay and grain and made needed repairs on the farm.

They made no fuss about their acts. It merely shows that old-fashioned "neighborliness" still exists in this selfish, warring world.

Hit the Jackpot

In 1939, one of my young friends, Carl Gray, purchased a 300-acre farm for $60 an acre. He had only enough to make a small down payment, but the banker had faith in his management and integrity.

Last year, Carl grossed $71 per acre off his peas, and this year he will do much better. While out to his place the other day doctoring a sick cow, he told me he had the place clear, and would have around $10,000 in the bank this fall. Fairly good wages for five years we would say.

The War Comes Closer Home

Last week, the flag draped body of Dean Peterson came home. He was an aviator in the North Pacific area. Only last year, his brother, Bernard, also a flyer, had lost his life in the Atlantic area.

Then news of the death of Craig Shampine in a Japanese prison camp came through last month, while Jack Weber, another of my young friends, lost his life in Sicily. In all, perhaps a dozen boys from this community have paid the supreme sacrifice for their country. Our only son, a captain in the intelligence service, is somewhere in the Pacific area, we know not where.

However, I am quite a fatalist, and believe that one will live until his time comes,

whether in peace or war. In the short space of 45 years, I have seen three wars embroil our country, and they all had the same aftermath of death and broken lives.

When one reads history, from the days of antiquity up through the centuries, he takes with a grain of salt the hectic efforts of sincere but deluded people who predict the end of all wars. We hope that time will come, but human nature will have to make a radical change before such a millenium occurs.

A Peek Into the Hereafter

I have always been interested in a mild study of the supernatural and the hereafter, and have read many books on the subject. Perhaps the Bible depicts human nature better than any volume in existence, and is always worth reading. We do not disbelieve in religious doctrines, and we think there must be a Supreme Being governing our universe, but we look at various viewpoints on the life beyond much like the old colored minister in explaining faith and hope:

"Now, dar is Mister Ras Jackson, an' Missus Ras Jackson, an' dere nine bright an' shinin' chillen. Mrs. Jackson she done knows dem chillen am her'n—dat's faith; Ras thinks dey is his'n—dat's hope."

All I know about the hereafter is that when my breath finally leaves my body, and the first object I meet is a middle-aged female spirit carrying a pup in the last stages of distemper, or a tired looking soul leading a horse with impaction, I'll know I am in the lower regions. Sauntering up to the head of the roaring inferno, I'll ask:

"Well, Satan, what's cookin'?"

"A big bunch of Japs sent down for extra special barbecuin'," he would reply.

Then, I would grab a shovel, join the swing shift, and start stoking the furnace.

But, on the contrary if I found a cow stretched out on a cloud with an uncomplicated case of milk fever, or heard the pins bouncing off a bowling alley, I would sit up and take notice. Then, when one of the angels told me the slot machines paid on every pull, and they had no phones or night calls, I would reverently exclaim:

"Holy Cats! This must be heaven!"

Being of a naturally curious disposition I would start walking around the golden streets to see the sights, and meet St. Peter, who would ask me in a friendly voice:

"Howdy, Doc, What do you think of heaven?"

"Well, Pete," we would reply, "so far, so good, but you gotta go some to beat Idaho."

(To be continued)

A small section of the sheep country which, in the author's opinion, vies with heaven!

Case Reports

Atypical Purpura Hemorrhagica in a Mare

June 28, 1943, a six-year-old, bay mare, weighing 1400 pounds and in fair condition, was presented for treatment.

History.—Three days earlier the mare had been worked with her mate. That evening both the horses refused their food. The next morning the mate ate and was apparently normal but a veterinarian was called to treat the mare. Her trouble was diagnosed as indigestion (probably from eating weeds at the end of the rows while working the day before) and was treated as such.

There was a sharply defined area of swelling between the fore legs

The following day the mare was very toxic and showed a nervous disturbance by a tendency to push objects with her head. Later she refused to go forward and walked only backwards. Her tongue became greatly swollen and protruded from her mouth three or four inches. She was treated again by the veterinarian. About midnight the mare raised her head unusually high while moving about her stall. Within five to ten minutes swelling appeared around the nostrils and mouth. The mare had been bred April 2, 1943.

Symptoms.—There was extensive edematous swelling of the lower one-third of the head. The size of the air passages was greatly reduced causing a slight dyspnea. There was a serous bilateral nasal discharge. The swelling in the tongue had disappeared but the mouth could be opened only slightly. The chin was large and firm. Red stained serum exuded from the eroded surface upon slight pressure. The nasal and oral mucous membranes were bright red and congested but no petechiae could be seen on them. The mucous membrane of the eyes was extremely red and a grey mucous exudate was present in the medial canthi. The upper eye lids were swollen until the eyes were nearly closed. There was also a sharply defined area of swelling between the front legs, which was much softer than the swelling in the head. It extended over a surface seven to eight inches in circumference and was two to three inches thick. The mare stood with lowered head and presented a sleepy appearance, continually trying to lean against some object in an effort to support herself.

Diagnosis and Prognosis.—The case was diagnosed as purpura hemorrhagica and an unfavorable prognosis given.

Treatment.—Five hundred cubic centimeters of citrated blood was given intravenously. This was followed by 400cc of 3% formalin solution, intravenously. No improvement was noted. Breathing became very labored and the mare died the following morning.

Necropsy.—There was a severe hemorrhagic gastritis with a slight amount of fibrin formation. The mucosa of both the small and large intestine was thick and edematous. The cecum was congested and contained a mucus exudate. Numerous strongyles were present. The liver had a parboiled appearance and was pale and friable. The lungs were edematous and the thoracic cavity contained about 1½ gallons of serum. There was a 12-week-old fetus in the uterus. It appeared to have been dead two or three days. The uterine mucosa contained several necrotic areas with a suppurative exudate.

Discussion. — Purpura hemorrhagica is most apt to develop following some infectious disease or poorly drained necrotic wound. In this case the necrotic uterus and dead fetus possibly were the source of

trouble. However, from the history it seems that death of the fetus may have resulted from the toxic gastroenteritis.

LEONARD MOHNEY

Sawyer, Kans.

Cesarean Section an Economic Measure in Traumatic Gastritis

March 9, 1943, a three-year-old, blue roan cow was presented for treatment. The owner reported that she was due to calve in a month or less. He had given her a laxative (an unidentifiable yellow powder), thinking she was constipated.

A rectal examination revealed a large fetus. The feces were a very sticky yellowish mass. The color was probably due to the powder the owner had given the cow. Her eyes were sunken and she had a somewhat anxious expression and slight icterus around the eyes. At short intervals, the animal emitted a slight grunt. Percussion of the chest produced a marked grunt. Although the cow had been "off feed" she seemed to take some interest in alfalfa hay when it was offered to her. The temperature was normal.

A diagnosis of traumatic gastritis was made and a doubtful prognosis was given. A stomach tube was passed and the cow was given two buckets of water containing the following:

½ pound magnesium sulfate
½ pint of syrup
½ pint of calcium borogluconate solution

For the next four days, despite all attempts to restore the appetite, together with the use of supportive treatment, the condition of the animal became definitely worse each day. Another rectal examination showed the calf to be alive, and since the cow had refused food for over a week and was definitely going "down hill" it was decided to operate in an attempt to save the calf.

A cesarean section was performed. The technic described in E. R. Frank's "Veterinary Surgery Notes" was followed. As an anesthetic 40cc of a 2% solution of procaine was administered epidurally. The cow was cast. An area extending from the udder to the umbilicus and from the median line to the right subcutaneous abdominal vein was shaved. Procaine was infiltrated subcutaneously throughout the operative area. The skin was then cleaned with carbon tetrachloride and a bichloride of mercury pack applied for five minutes. A skin incision approximately twelve inches long was made between the median line and the "milk vein." The posterior of the cow was then rotated to a dorsal recumbency and the incision was extended through the aponeurosis of the abdominal muscles. At this point, a thick, congested heavy membrane, or tissue, was encountered. The calf was easily palpatable through this congested tissue, and it was thought the uterus had been encountered. Later this supposed uterus proved to be a layer of omentum and peritoneum which, due to extensive abdominal pathology was changed in structure. An unsuccessful attempt was made to reach around this congested membrane and grasp the end of a horn of the uterus and pull it out through the abdominal incision. An incision was then made through the tissue (which was revealed as a pathological structure) and the uterus was then easily located, brought to the abdominal incision, opened without delay and a live heifer calf delivered. The uterus was closed with two rows of continuous Lembert sutures. The incisions through aponeurosis and peritoneum were closed with one continuous suture and the skin with a mattress suture.

Despite feeding through the stomach tube and intravenous injections of dextrose, the cow died five days later.

Post-mortem examination revealed a piece of metal approximately three inches long and a quarter of an inch wide lying free in a pus pocket which extended between the diaphragm and the reticulum and part of the rumen. Pus tracts were also found running to the liver and spleen. A slight pleuritis and a generalized peritonitis were present. The abomasum was inflamed, substantiating the diagnosis. The lesions showed that the cow would have died in any case. As a result of the operation—the calf was saved.

RICHARD I. BUCHLI

Oklahoma City, Okla.

Cutaneous Hemorrhage in a Mule

A jenny mule was presented for treatment for cutaneous hemorrhages on June 8, 1943.

The history was that this mule had refused to eat two months previous to this call and the owner had given the animal a change of feed and a week's rest after which she apparently returned to normal. However, six weeks after the illness, the

The clotted blood hung in threads from all parts of the body

owner drove the mule from the pasture which was bordering a stagnant river. He noticed epistaxis and hemorrhages from various portions of the animal's body and supposed them to have been caused by insect bites.

The hemorrhages were intermittant for two weeks and then the call of June 8th was made. Examination revealed that the animal was 27 years old, had a temperature of 104.4°F., marked anemia, constipation, pulse rate of 88 and numerous nodules (1cm in diameter) all over the body. Blood was oozing from the majority of these elevations and also from areas free of nodules. On movement by the mule, various other hemorrhages were seen to break out spontaneously from the skin. The clotted blood hung in finger-like threads 2½ to 3cm long from all parts of the body.

Treatment consisted of one pound of magnesium sulfate and five gallons of water, by stomach tube, 500cc of 25% dextrose solution and 500cc of 25% calcium gluconate given intravenously. The animal died one week later.

Necropsy—through necessity incomplete—revealed numerous subcutaneous hemorrhages and anasarca.

This case is interesting because several clinicians of 25 years' experience had never seen anything similar. It may have been atypical purpura hemorrhagica or the hemorrhages may have been correlated with avitaminosis P.

G. W. VACURA

Jackson, Minn.

Mildew Poisoning in Sheep

A band of 1,500 sheep, which had been on pea stubble for nearly a month without any trouble, was moved into another field of stubble. A light rain had fallen a few days before which was followed by rather warm weather.

About the fifth day in this new location the herder noticed several sheep "acting funny." They walked around with their heads in the air, finally lost control of their legs, staggered a few yards and died in terrible agony. A few had a slight diarrhea but most of them were evidently constipated, according to the herder. That night and the next day nearly 60 fine yearling ewes lay dead.

Post-mortem findings.—A sick sheep, almost dead, was killed and examined but it showed no pathological lesions whatever, except a very dry omasum.

Diagnosis.—Forage poisoning from mildewed pea vines which had drooped over the ground and so had not been harvested. The late Doctor Pammel in his complete "Manual of Poisonous Plants" mentions the fact that there are over 10,000 varieties of mildews and molds. However, the most important question to the average practitioner

is: "Why do some of these otherwise harmless molds become deadly at certain times?"

Treatment.—A change to higher ground was advised. In addition alkalizer mixtures, mostly calcium, were mixed with salt and the amount of the latter nearly doubled. With plenty of salt, the digestive tract seems to take care of many weeds that might otherwise cause trouble. The herder was given a dose syringe and some colic medicine to administer to any animals appearing sick—with the cheering information that about nine out of 10 exhibiting these symptoms would die.

E. T. BAKER

Moscow, Idaho

★ ★ ★ BUY WAR ★ ★ ★
STAMPS AND BONDS

Lymphangitis (?) in a Mare

One fall I was called to see a seven-year-old mare and found her with the right leg enormously swollen and she was in such pain that she refused to move. The skin was not broken anywhere that I could find but there was a scar just below the vulva. The owner said she had snagged herself there about 18 months previously. I used hot fomentations and anodynes hypodermically. The next day the mare was able to walk to the barn. A week later, on my next visit, I discovered a soft spot on the inside of the thigh just above the udder. When this was lanced a lot of bloody pus was liberated. This reduced the swelling in the leg somewhat but a few days later an abscess developed just above the hock. This also was lanced and was followed after a few days by an abscess above the fetlock. This too was opened. The size of the leg was further reduced but all three incisions continued to drain freely. My instructions were that hot fomentations be applied twice daily, that the wounds be kept open, that the leg be kept sprayed to keep off flies and to allow the mare all the exercise she wanted. About nine weeks later I met the owner and he said the incision wounds were healed, the leg was practically normal size and he was using her for light work about the farm. Whether the trouble was caused by the snag which entered just below the vulva or whether it was even partly to blame I am unable to say but I am inclined to believe that it was the cause and that this was a delayed flare up of the old infection.

REMBRANDT MORGAN

Winfield, W. Virginia

Fibroma on a Bear

In the spring of 1943, a small tumor was noticed on the chest of a 6-year-old male brown bear in the Sunset Park Zoo, Manhattan, Kans.

This tumor appeared to the left of the median plane on the chest at approximately the location of the rudimentary mammary gland. It appeared to be attached by a narrow base with the main tumor mass of about the size of a small walnut.

Later a call was made to the zoo to remove the tumor. The call was made just before feeding time in hope that food might divert the bear's attention while the operation was being performed. The bear was very hungry and stood upright with his fore paws against the bars of the cage to reach food held high, just within reach of his mouth while standing in this position. This position made the tumor accessible and within reach through the bars of the cage. During the removal of the tumor, food was given continually through the bars to keep the bear in this upright position.

No anesthetic was given. A pair of long handled forceps was introduced through the bars of the cage and clamped on the tumor and a pair of long handled scissors was then used to remove the tumor at its narrow base of attachment.

The tumor seemed rather avascular and insensitive as there was no hemorrhage following the operation, and the bear did not jerk or quit eating during the operation.

Grossly the tumor was somewhat oblong in shape and measured 2.8cm long and 2cm wide. It was attached at about the middle of the long axis by a stalk of tissue measuring 1cm in width and 1cm in length. The surface of the tumor was somewhat uneven—resembling the skin of an orange.

The epithelium covering the tumor was delicate in texture and smooth to the touch. Opposite the base of attachment appeared a very small recently formed scab under which there was some pus.

Histologically, the tumor was found to be a fibroma covered with stratified squamous epithelium. The fibroblasts of the tumor were not especially active and no mitotic figures were seen. The mass was moderately vascular and contained a number of cysts which were filled with serous fluid. In a small area opposite the base of attachment the epithelium was completely desquamated and was undergoing liquefaction necrosis. The tumor was slow growing and benign in character.

The bear made an uneventful recovery from the operation.

Fox[1] describes three tumor growths in bears, however he does not describe any of this nature.

F. H. OBERST

McPherson, Kans.

Sporadic Occurrence of Blackleg

On July 10, 1943, while accompanying a local practitioner on routine calls, I observed a Guernsey bull calf, five months of age, weighing approximately 200 pounds, which exhibited a marked lameness in both hind legs with pronounced swellings of the thighs. The swellings were cold and painless and pressure on the area resulted in marked crepitant sounds. The skin was dry and parchment-like. There was no marked rise in temperature (103.2° F) but there was anorexia, suspension of rumination and depression.

A few hours later the animal was down, the extremities cold and the temperature subnormal. A frothy, bloody exudate was noticed from the mouth and anus. Within six hours the animal was dead. A tentative diagnosis of blackleg was made and the calf carefully removed to a neighboring field where a post-mortem examination was made. The animal lay adjacent to a trench, six feet deep, dug for its burial. The carcass was distended with gas from intestinal fermentation and extensive gas formation was noticed under the skin and in the masculature of the animal. The swellings extended to the sixth ribs with sero-hemorrhagic infiltration throughout, being especially pronounced in the outside of the hind quarters, which were so inflated that the two legs on the upper side of the carcass stood out straight without touching the ground.

The affected muscles were brownish black

Advanced clinical cases of blackleg, showing gaseous swelling of the muscles in the gluteal region

and they were surrounded by bloody liquid and gas. There was a mild enteritis and the contents of the bowel were covered with blood. There was no myocardial or valvular involvement, but the pericardium was filled with a bloody exudate. The spleen was normal but the entire liver showed small hemorrhagic foci.

The animal was covered with a layer of quicklime and buried under six feet of terra firma. The operator practiced extreme precaution in disinfecting clothes, instruments, debris and soil of the area of post-mortem examination.

Blackleg, also known as "quarter ill" and "symptomatic anthrax," is an acute infectious disease affecting young cattle but not infrequently seen in feed steers. It was formerly regarded as being identical with anthrax. The specific cause of blackleg is *Clostridium chauvei,* a very resistant spore forming anærobe, ubiquitous in nature, which is especially troublesome on the ranges of the West and in Europe where the disease is quite prevalent.

The spores of this organism may lie dormant in the pasture for several years, yet retain their virulence and under favorable

[1] Fox, Herbert, 1923. Disease in captive wild mammals and birds, J. B. Lippincott Co., Philadelphia.

circumstances invade the tissues of an animal and proliferate with great rapidity. The organisms usually enter through wounds or abrasions although it is believed that they may enter through the mucous membrane. Being anærobic, small wounds are more favorable to proliferation than large gaping wounds. As a rule, this disease affects cattle six months to two years of age. Purebred, and those in high condition, seem to be more susceptible than scrub stock or calves in poor condition. Sheep and goats are susceptible.

Differential Diagnosis

1. *Anthrax.*—Since an enlarged spleen with marked pathological findings is almost pathognonomic for anthrax, our findings here of a normal spleen eliminate this possibility.

2. *Malignant Edema.*—This disease is very much like blackleg and frequently both diseases occur simultaneously. They are difficult to differentiate clinically.

3. *Hemorrhagic Septicemia.*—This disease affects animals of all ages and the hemorrhagic infiltration presents no crepitant sound.

Laboratory Aids

Laboratory examination to differentiate the organism are; (1) the microscope, and (2) the inoculation of test animals which is indispensable to a conclusive diagnosis. Inoculation experiments on guinea pigs, rabbits, and chickens will disclose the difference between blackleg, anthrax, and malignant edema. All three are killed by the *Clostridium septicum* of malignant edema, the guinea pig and chicken by the anthrax organism, but only the guinea pig by *C. chavei.*

The only effective means for protection against blackleg is vaccination and the use of anti-blackleg serum for passive immunization of short duration.

In the case described all young stock on the premises were given antiserum immediately and, on the advice of the veterinarian in charge of the case, all livestock was vaccinated with blackleg bacterin.

This occurrence of blackleg in this locality was the first in the history of the community. Its presence may have been due to contamination of a water source from some enzootic area, or by the introduction into the fed lot through grains delivered from outside sources.

H. CARLTON NEWMAN.

Waltham, Mass.

Worms in the Genital Organs of a Colt

The article by Rembrandt Morgan in the September issue of VETERINARY MEDICINE in which he discusses finding a large worm (2½ inches long) in the spermatic sheath was interesting to me. It recalled to my mind a similar case which I saw with Doctor Sherman of Orona, Ontario. However, it was different inasmuch that in our case the entire testicle and peritoneal coverings were filled with "Peritoneal Worms." The colt was in an extremely emaciated condition. The specimen was kept.

W. B. DURRELL

Simcoe, Ontario

Restraint of the Boar for Castration*

On a country call the suggestion may arise that there is also a boar to castrate, and the assumption made that the task is too difficult with the assistance available. With one assistant, the veterinarian should accomplish this operation in not more than five minutes.

The easiest and quickest manner of castrating the horse, bull or calf is always in the standing position, and it is even more true of the boar. If restraint is attempted with a loop about the upper jaw, pulling back may slide the hind legs forward under the animal and bring the field of operation entirely beneath the animal on the ground and thus be impossible to manipulate.

With a tight loop above one hock, and adding one-half hitch, lower on the leg, then elevating that leg so the boar maintains balance on three legs, yet cannot use the raised leg freely; it will remain standing with the field spread open and in

*Dedicated to Dr. R. L. Smith with whom I served in Vet. O.T.C. at Chicamauga Park in 1918 and who has a farm stocked with purebred animals, on the banks of the Wabash

good position and without untoward movement. A five-foot length of rope is sufficient for the job.

If the animal is in a small pen, place a board across the top. If there is a gate, arrange to work thru the gate, opened after the animal is restrained. If necessary squeeze between panels, one end closed and the other end open to admit operator. The animal is unable to turn towards or away from the operator and so things are simplified.

I carry a sterilized emasculator wrapped in a towel, and prefer a long sharp pointed bistory for making one long clean incision in the skin only. If the testicle is incised, unnecessary hemorrhage occurs to foul the

An erstwhile apparatus for restraint of hog for operation or castration

field, hands and clothing. When the testicle is dropped out, it does not touch the ground and hangs in mid-air. The field may be properly cleaned, and a dusting powder applied after the operation.

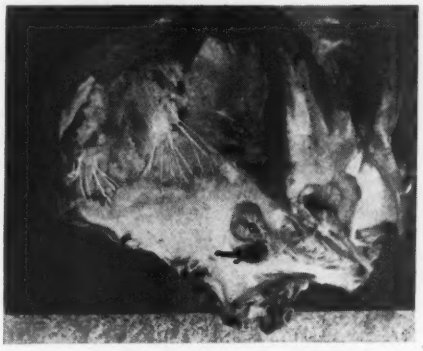
The owner is so agreeably impressed with the dispatch of the undertaking that the inclusion of a very liberal fee passes entirely unnoticed. Even if the owner hails from the corn belt, and is familiar with swine husbandry, one may sense that he is pleased to have the ordeal over with so handily.

VICTOR C. PAUHLMAN

Puyallup, Wash.

Persistent Foramen Ovale in a Foal

An aged Belgian mare owned by the Animal Husbandry Department of Kansas State College was assisted in parturition by members of the ambulatory clinic of the School



In the heart pictured an arrow indicates the opening anterior to the limbus

of Veterinary Medicine on the morning of April 21, 1932. The foal had been carried 16 days overtime and was born with some difficulty in a normal anterior position. It appeared normal in every respect except it was unable to breathe and soon became very cyanotic and the heart rate was accelerated. Artificial respiration and respiratory stimulants were of no avail. A diagnosis of persistent foramen ovale was made.

The foal died two hours after birth. Upon autopsy a large opening was found in the fenestrae of the fossa ovalis and an opening anterior to the limbus fossa ovalis (the concave lateral margin). This is pictured above with an arrow indicating the opening anterior to the limbus.

The placenta was retained in the mare, and upon removal extensive hemorrhagic areas were seen on the chorionic layers of the placenta.

This is such a rare condition in animals that some authorities question the diagnosis in spite of the rather obvious symptoms and the post-mortem findings. Williams reports seeing two cases. Delafield and Pruden say the foramen remains partly open; that the condition prevails throughout life without ill effects; and that it has been found by

some observers in about one-fifth of their autopsies.

A similar case occurred at the Animal Husbandry barn 15 days previous to the one mentioned above. A one-day-old, male foal from the same stallion was observed and a diagnosis of persistent foramen ovale made. This foal was apparently normal at the time that the second one was born.

Following the above case the author has autopsied two foals. A still-born foal was found to have fenestrae approximately two millimeters in diameter, but no opening was present anterior to the limbus. A six-weeks-old foal, dead of navel ill, was examined and found to have remnants of the fenestrae, but they were constricted down to where little or no blood could get through.

The reason for making this case report is to call the attention of the reader to the rather uncertain evidence to substantiate this diagnosis and to see if there are other observers who can substantiate it.

AMOS P. WILSON

Manhattan, Kans.

Inguinal Hernia in a Bitch

A nine-year-old Scotch terrier was presented to Dr. M. L. Dietrich, Newton, Kans., for euthanasia. The dog had a firm, pendulous enlargement in the left inguinal region. The history revealed that the enlargement had been present for a year or more, and was gradually getting larger. Recently the dog had gone off feed, and was having trouble urinating.

After examination, it was decided that the dog could be treated surgically and probably saved. Permission was obtained from the owner to proceed with the treatment.

The dog was confined on the table, and given 5cc of nembutal intravenously. An area in the left inguinal region was shaved and prepared for operation. An elliptical incision four inches long was made over the enlargement, and the subcutaneous tissue was broken down by blunt dissection. The enlargement proved to be the bladder which had escaped through the left inguinal canal. There was partial strangulation in the region of the neck, and the organ was distended with urine. By means of a trochar and canula the urine was drained off and the bladder collapsed. A Lembert suture of No. 00 chromic catgut was taken in the opening made by the canula. The bladder was sprinkled with sulfanilamide powder and replaced. One and one-half drams of the same powder was placed directly into the abdominal cavity. The inguinal canal was closed with three interrupted sutures of No. 1 chromic catgut. The skin incision was closed with several interrupted sutures of horse hair, and painted with Margreen.

The prognosis was unfavorable as the bladder showed evidence of strangulation.

In six hours the dog recovered from the anesthetic, and was given 21 grains of sulfathiazole orally. This was continued for three days, giving seven grains three times a day.

At the end of four days the dog had recovered from the operation and was eating and urinating normally. Six months later she showed no evidence of the hernia except the scar, and was as playful as ever.

ORVIN H. HOLLER

Conway, Kans.

Puncture Wound in the Thigh of a Horse

April 27, 1943, an emergency call was received by the veterinary clinic of the Kansas State College to treat a horse that had been injured and was bleeding profusely. The subject was a five-year-old, Percheron gelding, and the wound was on the anteriomedial surface of the thigh near the floor of the abdomen. A stream of venous blood was flowing freely from the wound. A tourniquet was applied distal to the wound to control the hemorrhage. The wound was probed, but no foreign object was found. The wound appeared to extend upward, slightly forward, and medially, the probe coming in contact with the ventral surface of the pubis. The wound in the flesh was in the nature of a puncture wound about three-eighths of an inch in diameter. The cause could not be determined as the accident was not observed and no foreign object could be found in the wound. After careful consideration of the symptoms and nature

of the injury a diagnosis of puncture of the femoral vein was made.

After the hemorrhage had been controlled a pressure pack was applied to the wound and held in place by a bandage going up over the tail head and down anterior to the tuber coxae. A dose of fifteen hundred units of tetanus anti-toxin was administered subcutaneously. The animal appeared to be making a satisfactory recovery, but one morning, eight days after the accident, it was brought to the clinic with symptoms of severe colic. The mucous membranes and the conjunctiva were cyanotic. By two o'clock the horse was dead.

An autopsy was performed. Extensive and severe peritonitis was present, and a large quantity of clear, straw-colored fluid was contained in the peritoneal cavity. On examining the area of the wound the conclusion was drawn that some penetrating object had punctured the femoral vein, glanced forward on the ventral surface of the pubis and penetrated the posterior wall of the inguinal canal, introducing bacteria into the peritoneal cavity. It is believed that the horse stepped on a curved stick with his front foot, forcing it up to his thigh. As the horse moved forward the stick punctured the skin, moved upward and finally forward into the posterior wall of the inguinal canal.

ARLAN MCCLURKIN

Clay Center, Kans.

Lymphocytosis in a Cow

A six-year-old, white, Shorthorn cow was presented for treatment Feb. 5, 1943. The owner had noticed a swelling in the right flank about six weeks previously. She had been bred about the first of November and had not been in estrum since.

The animal was suffering from decubitus. She had a large firm swelling in the lower part of the right flank, a brownish diarrhea and a thin cloudy discharge from the vagina. Her temperature, pulse and respiration were normal.

Rectal examination revealed the pelvic cavity to be nearly filled by what was thought to be inflammatory tissue. A tentative diagnosis of extensive cellulitis was made and it was recommended that the cow be destroyed.

In the post-mortem room, a tumor 45cm by 40cm by 25cm (18x16x10 inches) was removed from the right flank. The mesenteric lymph nodes were enlarged greatly. Tumors, ranging in size from one to several inches

Section through lymphocytosis from abdomen of cow

in diameter, were found throughout the mesentery. The wall of the uterus was light-colored and an inch or more in thickness. The lumen contained a few ounces of cloudy fluid.

Tumors were found throughout the mediastinum and lungs. A growth was found on the left auricle around the pulmonary artery. The heart wall was greatly thickened, especially the septum ventriculorum. White spots were found on the kidneys. One kidney contained a cyst which had caused atrophy of the parenchymatus tissue. The cyst contained a fluid of the appearance and odor of urine. The liver showed light-colored areas. The skeletal muscles were mottled with light-colored areas also.

A specimen from the large tumor of the flank was sectioned and a diagnosis of lymphocytoma was made.

This case was unusual in that the right precural lymph node was the only peripheral node affected.

In cases of lymphocytoma an early diagnosis is of economic importance in that the animal can be destroyed and thus a saving can be made in feed and care.

KENNETH P. MITCHELL

Wahoo, Nebr.

The Treatment of Dry Eczema in Dogs

Eczema is a troublesome skin disease often encountered in small animal practice. After trying a variety of different medicaments I have, for some time now, been using a method which has given excellent results in a large majority of the many cases in which I have used it—altogether nearly 300. One distinct advantage is that the initial improvement takes place so quickly that the owner is encouraged to follow through on the treatment until the case is cleared. In most of the cases there was the severe itching, dryness and thickness of the skin accompanied by crust formation, loss of hair and sometimes pigmentation, as is manifested in dry eczema.

The treatment in general was practically the same in all cases. The hair was clipped well around the involved area and a special lotion of colloidal sulfur* was rubbed in thoroughly twice a day with a cotton swab. The owner was given some of the lotion with instructions to use it as directed morning and evening. In addition 1cc of aricyl was administered subcutaneously and tablets, each containing ½ grain echinacea, 5 grains potassium bitartrate and 7½ grains of sulfur, were given three times a day. Every three days another injection of aricyl was given and repeated as necessary. There were never more than five injections needed and usually a lesser number.

The time needed for treatment averaged three weeks—the shortest time being 10 days and the longest two months. In midsummer it took longer to clear the cases than in fall. To be designated a cleared case it must be free from crusts or patches, the skin soft and pliable and no inflammation or itching remaining. It seemed to me that the sulfur lotion played a large part in the rapid clearing of the eczematous condition in the cases where used as my internal, oral and dietary treatment in dry eczema has always been the same in all treatments but topical application has varied, many substances have been tried—calamine and zinc lotion, oil of cade and cottonseed oil, lotions and ointments of different kinds. There was a marked difference in the results secured with cases given the new treatment. Its convenience appeals to the owners of dogs as it is a yellowish creamy substance that rubs in readily, dries quickly and is not injurious to clothing or furniture or irritating to tender skin.

*Collo-Sul Lotion, Crookes Laboratories, Inc., N. Y.

In most cases of eczema there is severe itching—dry and thick skin

A few typical histories serve to illustrate the results secured:

Case No. 1.—An airdale, two years of age, which had been affected with eczema nearly four months was first seen Oct. 10, 1942. In two weeks the skin was softer and more pliable and was clearing. The lotion and other therapy was continued and when the patient was seen three weeks after the first call it was considered completely cleared.

Case No. 2.—Was a dog of mixed breed, three years of age. The disease had been in evidence for three weeks when first seen Aug. 15, 1942. The same treatment as outlined was followed and by Aug. 30 the dog was completely cleared.

Case No. 3.—This was a whitehaired fox terrier of three years which had been ill four to five days. It had a severe dermatitis with loss of hair extending the entire length of the back. It was first seen on April 30th and showed continued improvement at each successive treatment and was completely cleared when last seen May 23rd.

L. EVERETT ESTLER

Arlington, N. J.

✓ ✓ ✓ ✓

Abstracts

Ophthalmia in Dogs Due to Riboflavin Deficiency

Spies,[49] as a result of a 13 years' study of malnourished persons records observations on animals associated with persons suffering from various nutritional deficiencies. He has long noted that where one member of a family is a victim of nutritional deficiency, other members and perhaps all members of the family living together suffer in the same manner. Less often, but frequently enough to be striking, dogs belonging to the family also experience the same deficiencies. This is particularly true of families suffering from pellagra where it is not uncommon to find the family dogs manifesting black-tongue. It has long been a rule with the author when a diagnosis of a deficiency is made in a person to extend the study to all members of the family. More recently pets belonging to the family are studied also and in at least one instance the finding of nutritional deficiencies in a dog fed upon scraps from the family table led to a better understanding of the ill health of the family.

However, it is the discussion of a panophthalmia in four dogs, due to riboflavin deficiency that possesses the greatest interest for veterinarians. Vitamins A, B, niacin and D deficiencies in dogs are well known if not always recognized but riboflavin deficiency in this animal seems to have escaped observation. Although, according to Spies, it is not rare. To quote the author:

"The dogs were emaciated, weak, sluggish, apathetic and held their heads much lower than the rest of their bodies. They refused food and all efforts to coax them to eat were without avail. Each dog had diarrhea characterized by frequent watery, foul-smelling stools. Saliva drooled continuously from their mouths. Examination of the mouth revealed the oral mucous membrane lesions characteristic of black-tongue.[1] While examining these animals lacrimation was observed. Even the light from a small flashlight in their eyes enlisted photophobia. In general the eyes appeared similar to those of persons with riboflavin deficiency which I have described,[2,3] and this suggested to me that these dogs had not only black-tongue, but riboflavin deficiency as well. A careful examination of their eyes showed pronounced injection of the sclerae and conjunctiva of both eyes. The vessels were unusually dilated and tortuous. There was a suggestion of rotary nystagmus. The animals did not keep their eyes still enough to carry out satisfactory slit lamp examinations. However, clinically the process appears similar to that in human beings, although in each of these dogs it was more extensive than I usually have seen in persons.

"The photophobia was so severe and it was so difficult to keep the eyes still that satisfactory colored photographs were obtained only after numerous trials and errors."

Because of the frequency of sudden death from black-tongue these dogs were first treated for that condition. They were given, hypodermically, 150mgm nicotinamide immediately, and in each case the animal showed marked improvement 20 hours later; was obviously much stronger and ate the food offered to him. The fiery redness of the mucous membrane of the mouth had faded considerably, the salivation had decreased and the diarrhea stopped. However, there was no improvement of the ophthalmia.

Next these animals were given 50mgm of riboflavin intravenously. They showed distinct improvement 24 hours later. Within 72 hours there was no detectable lacrimation or photophobia, no nystagmus and the redness and general increase in vascularity had subsided.

In the general discussion the author emphasizes that the natural development of deficiency diseases is slow; the onset insidious and difficult to recognize. This has

[49] Spies, Tom D., 1943. The natural occurrence of riboflavin deficiency in the eyes of dogs. *Science*, 98: 2547 (Oct. 22, 1943), pp. 369-370.

[1] Duncan, Garfield G., 1942. *"Diseases of Metabolism,"* 489 pp. Philadelphia: W. B. Saunders Company.

[2] Spies, Tom D., William B. Bean and William F. Ashe, 1939. *Annals of Int. Med.*, 12: 1830-1844.

[3] Kruse, H. D., V. P. Sydenstricker, W. H. Sebrell and H. M. Cleckley, 1940. *Public Health Reports*, 55: 157-169.

been pointed out repeatedly in the pages of this magazine by Patton and others but is not yet sufficiently appreciated by veterinarians. To quote Spies again: "Long before the nutritive failure can be diagnosed as pellagra, beri beri, scurvy, riboflavin deficiency or some one clear-cut syndrome, the afflicted persons have had months or years of ill-health."

It is also pointed out that nutritional deficiencies are commonly superimposed one upon another rather than occurring singly, and this is in complete accord with observations made upon these dogs.

Beef Blood As a Substitute for Human Blood in Plasma Production

Lewis[48] after considerable experimentation suggests the possibility of using deantigenated beef blood instead of human blood in the production of blood plasma for the armed forces and for the civilian population. He found that after a modified racemization of the blood serum a plasma was obtained that was sufficiently deantigenated to be injected in guinea pigs without harming them, even when repeated after the lapse of three weeks. Used on dogs suffering from induced shock the results were good.

Sarcoptic Mange in a Dog Treated with Benzyl Benzoate

Mention has been made of the use of benzyl benzoate in the treatment of sarcopic mange in animals. We have treated 11 dogs affected with sarcopic mange[25] during the last six months, using a special emulsion of benzyl benzoate, and the results have been 100% successful. The diagnosis of mange was confirmed in four cases by finding the mite in the skin scrapings; the remaining cases showed typical clinical symptoms.

The treatment used was a 25% emulsion of benzyl benzoate, using a methyl cellulose emulsifying agent, with the addition of a propietary sodium lauryl sulphate preparation to produce a finer emulsion on the assumption that the presence of the latter substance lowered the surface tension of the benzyl benzoate. This emulsion is miscible with water, it has a not unpleasant odor and dries within a few minutes after application.

In long-haired dogs the hair should be clipped off the affected part only, unless the lesions are extensive; but clipping is not necessary in short-haired dogs. Preliminary bathing is not essential. The emulsion is worked well into the skin for some time to break down any scab formation and secure penetration. If the dog is bathed beforehand there seems to be a certain amount of reddening of the skin after application, which causes the dog to yelp when the emulsion is rubbed in vigorously. It is most important that it be worked well into the affected parts—it is not enough merely to spread the material on the surface. All the affected parts are treated at the same time. Those areas which, on careful clinical examination, are shown to be unaffected do not need to be treated.

It is found that, generally speaking, two ounces of the emulsion is sufficient for the initial treatment of a terrier, but the animal should be dressed again in three or four days. It is a significant fact, commented upon by owners, that the scratching stops almost immediately upon the first application.

There are many advantages to this method. Besides being clean there is no unpleasant order, it is easily removed from the hands, the animal can stay indoors during treatment and the cure is complete in one week, instead of the usual three or four weeks. The emulsion has greater penetrating powers than sulphur and oil as it seems to be directly lethal to the mite by attacking its hard protective coat. Tetraethylthiuram monosulphide also possesses many of these advantages. The disadvantages of this treatment are the cost and the need for a correct diagnosis. Benzyl benzoate is a specific for sarcopic mange but appears to have no effect upon the follicular type and is disastrous if used for eczema, especially the moist variety. The veterinarian must, therefore, be absolutely sure of his diagnosis before using the emulsion.

[48] Lewis, Julian H., 1943. Deantigenated beef blood plasma as a possible substitute for human blood plasma. *Science*, 98:2547 (Oct. 22, 1943), pp. 371-372.

[25] Joss, G. E., 1942. The treatment of sarcoptic mange with benzyl benzoate. *Vet. Rec.*, 54:51, p. 533.

A

Abbott, John E., 43
Allen, Bertram V., 43
Allen, A. E., 119
Allen, R. W., 384
Alston, J. T., 70
Altshuler, S. S., 328
Anderson, F. A., 70
Andrews, F. N., 37, 78
Anigstein, Ludwik, 221
Atkeson, F. W., 237
Atkinson, G., 199

B

Bailey, O. L., 129
Baker, E. T., 29, 74, 109, 150, 190, 195, 229, 239, 267, 312, 348, 392, 432, 480, 487
Barger, J. A., 446
Baurenfeind, J. C., 160
Bayles, G. W., 34
Bazeley, P. L., 356
Beach, J. R., 46, 147
Beckcom, E. A., 129
Benner, J. W., 67
Bennett, Paul C., 43
Bennion, N. L., 122
Bentham, W. S., 129
Bergman, H. D., 285
Berkowitz, Israel, 43
Bertotti, Richard D., 43
Biester, H. E., 257, 319
Blackmore, A. H., 400
Blastein, Morris E., 43
Blomquist, H. L., 243
Bourne, R. F., 446
Bower, C. W., 362
Bowen, L. E., 154
Bowman, D. E., 429
Bethke, R. M., 117
Breed, Frank, 430
Brinker, W. O., 4
Britton, J. W., 8
Brueckner, H. J., 118
Bryan, A. H., 340
Bryan, C. S., 19, 21, 283
Brown, Theodore W., 43
Buchler, Walter, 475
Buchli, Richard I., 486
Burch, Clark W., 43
Burde, G., 203
Burkholder, P. R., 372
Burgess, J. W., 411
Burkert, L. H., 156
Bussett, B., 315

C

Campbell, T. C., 354
Canipelli, E., 237
Carlin, M. H., 129
Carpenter, C. D., 164, 369, 446
Case, Lewis I., 43
Cave, H. W., 237
Chastain, Ernest F., 43
Christensen, J. F., 144
Christenson, I., 277
Clapesaddle, H., 40
Coates, A. S., 397
Coffin, D. L., 355
Cole, C. L., 337
Cole, W. H., 400
Collins, R., 293
Cook, R., 129
Cook, R. H., 435
Couch, J. B., 129
Court, Maurice J., 43
Crawford, A. B., 403
Crawford, A. W., 129
Crossley, M. E., 261
Cullison, James M., 43

D

Dack, G. M., 239
Danks, A. G., 319
Daseler, W., 353
Dashoff, A. D., 32
Davidson, J. L. V., 381
Davies, D. F., 429
Demke, Donald D., 43
Dermer, O. C., 478
Devries, L., 257, 319
Dikmans, G., 12, 87
Dimock, W. W., 361
Dinsmore, Wayne, 5
Dixon, O. H., 2
Doyle, L. P., 77, 447
Doyle, T. M., 357, 358
Durrell, W. B., 371, 490
Dykstra, R. R., 101, 257

E

Eagle, T. M., 129
Ebertz, Charles D., 43
Edwards, J. T., 475
Eichhorn, A., 101, 286, 320, 325
Elson, R. E., 447
Elvehjem, C. A., 244
Ely, W. N., 85
Emmel, W. W., 255
Emmerson, J. H., 32
Enzie, F. D., 302
Erb, R. E., 78
Erickson, R. N., 196
Estler, L. E., 494
Eveleth, D. F., 63, 148, 258
Eveleth, M. W., 63, 258
Eversole, Gardner S., 43

F

Fairbanks, B. W., 377
Farley, H., 320
Farquharson, James, 297, 364
Farr, H. W., 82
Featherly, H. I., 478
Fell, E. H., 440
Fisk, R. T., 203
Florey, H. W., 250
Folley, S. J., 81
Foster, A. O., 144, 355
Foster, Edwin N., 43
Fox, C. L., 236
Francis, E., 402
Frank, E. R., 38
Franks, C. C., 446
Frederick, L. D., 208, 251, 289, 343, 387
Free, A. H., 429
Fulstow, H., 233

G

Gadston, I., 359
Gallup, W. D., 159
Garlick, N., 114
Garrett, J. P., 198
Gatch, W. D., 403
Gates, C. W., 52
Gibson, J. I., 446
Glenny, W. C., 91
Gifford, R., 63
Gilbert, H. R., 78
Gold, H., 236
Gordon, G., 315
Gordon, R. F., 187
Gould, G. N., 241
Gory, E., 233
Govier, W. M., 440
Graessle, O. E., 277
Graham, C. C., 447
Gray, R. E., 251, 289, 343, 387
Green, Arthur L., 43
Green, H. N., 355
Greene, James E., 403, 466
Greig, J. R., 325
Greig, M., 440
Griffen, Will, 128, 129

H

Habermann, R. T., 96, 355
Hadley, F. B., 88, 329
Hagan, W. A., 238, 363
Hanselman, R., 440
Hanson, L. E., 226
Harbord, J. G., 44
Hardcastle, A. B., 384
Hardy, Eric, 48
Harnden, E. E., 299, 478
Harris, R. B., 280
Hart, G. H., 363
Hatfield, J. D., 77
Hawk, R. C., 446
Hawkins, F., 236
Hawkins, P. A., 337
Heaton, J. W., 129
Heiman, V., 171
Hendershott, R. A., 444
Hendricks, W. H., 444
Hendrickson, Roy, 167
Hensel, H. M., 328
Herman, C. M., 320
Hershey, S. E., 317
Hignett, S. L., 333
Hilton, J. H., 78
Hinman, R. B., 280
Hogan, A. D., 245
Holms, J., 439
Hollenbeck, J. B., 232
Holler, Orvin H., 492
Horsfall, F. L. Jr., 360
Hostetler, C. B., 275
Howe Nelson S., 43
Howell, C. E., 8
Hoyt, A., 203
Huddleston, I. F., 238
Hume, E. E., 83, 359
Hutt, Samuel, 43

I

Ishee, V. E., 129

J

Jackson, S. L., 437
Jennings, L. F., 19
Jensen, C. G., 4
Jensen, Jack, 447
Jensen, L. B., 279
Jerrold, D., 121
Johnson, L. W., 284
Jonata, M., 399
Joss, G. E., 496
Judge, J., 213

K

Kates, K. C., 77
Keane, J. J., 129
Keith, T. B., 215
Kelser, R. A., 42, 83, 240, 365
Kimball, K. E. C., 353
Kingman, H. E., 412
Kintner, J. N., 84
Kirk, Norman T., 205, 322
Kisseleff, Alfred, 43

Kline, E. W., 101
Krandel, H. C., 470
Krauss, W. E., 278
Krawitz, Leonard, 43
Krull, W. H., 72
Kuhlman, A. H., 159
Kunkel, L. O., 360

L

Landis, P. F., 129
Landsteiner, K., 402
Lane, F. K., 40
Larsen, Burt W., 43
Laugham, W., 118
Leininger, D. B., 322
Levine, P. P., 186
Levison, S. O., 399
Lewis, Julian H., 496
Linn, Frank J., 43
Little, R. B., 79, 160
Long, P. H., 359
Lord, J. W., 400

M

Mallsoff, W., 359
Manninger, R., 325
Marek, J., 325
Marsh, O. C., 410
Martin, F. E., 174
Marquardt, J. C., 476
Massey, Joseph R., 43
Maxwell, 129
Mayall, G., 398
Mayo, N. S., 362
McCay, C. M., 116
McClurkin, Arlan, 492
McCullom, E. V., 311
McEwen, A. D., 357
McKee, G. S., 438
McKenzie, Kenneth J., 43
McMillen, W. N., 118
McNutt, S. H., 22
McQueen, George L., 43
Mechstroth, F. C., 276
Menary, A. K., 447
Miller, A. W., 324
Mills, C., 200
Minnis, R. G., 384
Mitchell, H. H., 370
Mitchell, Kenneth P., 493
Mocsy, J., 77
Mohler, John R., 82, 163, 164, 204, 248, 320, 325, 448
Mohney, Leonard, 485
Moles, C. L., 446
Moody, Robert A., 43
Moore, G. R., 103
Morehouse, Edward W., 43
Morgan, Rembrandt, 352, 488
Morris, O., 318
Morrow, C., 36
Moser, Herman L., 43
Mostyn, H. J., 169
Munce, T. W., 366
Munger, Dorothy, 447
Munger, Maurene, 447
Mussehl, F. E., 116
Myers, B. J., 232

N

Nebb, Samuel S., 43
Neeheles, H., 399
Nelson, R. K., 158
Newman, H. Carlton, 489
Niemann, Karl W., 43
Norris, L. C., 160

O

Oberst, F. H., 488
Ogden, E., 283
Olivier, L., 384
Olsen, M. W., 119
Olver, Sir Arthur, 473
O'Rourke, M. J., 404

P

Packer, A., 22
Parkin, J., 355
Parran, T., 3, 140
Parsons, Elton V., 43
Patton, J. W., 262, 287
Paulsen, C. L., 275
Pauhlman, Victor C., 490
Pearse, A. S., 80
Peterman, J. E., 447
Pickett, Charles D., 43
Pirie, J. W., 442
Presler, Donald J., 43
Price, E. W., 294

Q

Quin, A. H., 415
Quin, J. L., 351
Quinby, B., 274

R

Rammelkamp, C. H., 1
Raudabaugh, Wm. G., 43
Randall, R., 84
Ray, J. D., 178
Rea, Robert C., 43
Record, P. R., 117
Reichert, Paul F., 43
Reinow, Bert., 43
Reynolds, F. H. J., 84
Rice, V. A., 37
Riddle, M., 38
Rieke, Glenn W., 43
Riley, F. L., 2
Ritter, Earl C., 43
Rivers, T. M., 360
Robb, A. D., 271
Robinson, H. E., 208, 323
Robinson, H. J., 277
Rochfort, Robert F., 43
Rose, Vilo T., 14
Rosenfeld, B., 205, 228
Rous, P., 360

S

Sahyun, M., 328
Salmon, O. N., 116
Sanders, C. L., 113
Sanders, D. A., 21
Sanders, E. F., 415
Schale, E., 278
Schoening, H. W., 403
Scorgie, N. J., 379
Schubert, Carl J., 43
Sepponen, Carl M., 43
Servias, Harold A., 43
Shaw, O. A., 237
Shea, Richard, 113
Sholl, 4
Shope, R. E., 206, 360
Shorb, D. A., 355
Shore, H. J., 219
Short, G. E., 200
Shrewsbury, C. L., 77
Schroeder, E. C., 166
Sigler, T. A., 35, 366
Simic, W. J., 354
Sims, B. T., 362
Slatter, Ervin E., 43
Smeltzer, W. H., 6
Smith, F. D., 301
Smith, H. C., 299, 447, 478
Smith, H. D., 129
Smith, H. R., 45
Snook, George 129
Spies, Tom D., 495
Splitter, E. J., 395
Stafford, J., 3
Stafseth, H. J., 180
Stanley, W. M., 360
Steele, Walter H., 43
Steenerson, T. L., 460
Steensma, R., 161
Steffen, M. R., 477
Stefko, P. L., 400
Stein, C. D., 130
Stephens, C., 70
Sternfels, Mark, 43
Stewart, G. F., 116
Stiles, G. W., 159
Stoddard, E. D., 276
Stoner, N., 2
Strain, C. B., 447
Stroup, W. L., 233
Stubbs, E. L., 355
Sunderville, E. J., 129
Sutton, Karl L., 43
Swann, H. C., 244
Swenson, M. J., 157

T

Taylor, E. L., 281
Tegg, M. A., 43
Templeton, G. S., 265
Thom, Myron, 129
Thompson, Edward E., 43
Thorp, F., 337
Thorp, W. T. S., 215

U

Udall, D. H., 87
Underwood, J. R., 84
Underwood, P. C., 12
Urshel, D. L., 440
Utterback, J. A., 305, 449, 457

V

Vacura, G. W., 487
Vail, B. B., 129
Van Es, L., 102, 399
Veenker, H. F., 326
Veenstra, Robert J., 43

W

Waas, F. J., 237
Waddell, Wm. F., 43
Wakim, K. G., 403
Walmsley, George, 129
Walter, L., 400
Warner, C. G., 113
Wassenaar, Peter W., 43
Waters, F. C., 127
Webb. L. M., 316
Weiss, Paul, 245
Welsh, M., 370
Wenner, P., 425
Weston, R. E., 399
Whitney, L. F., 302, 304, 419
Wickard, C. R., 41, 125, 167, 325
Williams, H. L., 250
Williams, J. P., 116
Williams, W. L., 326
Wilson, Amos P., 491
Wilson, Neil O., 43
Wingerter, Alvin R., 43
Winter, A. W., 129
Woodward, B. T., 115
Wooldridge, G. H., 372
Wooldridge, W. R., 126
Worthman, R. P., 234
Wright, C. C., 242
Wright, Donald A., 43

Z

Zimmerman, H. N., 474
Zimmerman, K., 435

A

Acetonemia in a cow, 114
of cattle, 93
Achievements, medical, 121
Achromotrichia, vitamins for, 448
Agar-agar, substitutes for, 243
Air raid food stuffs, damaged, 81
Air raids on animals, effects of, 48
Alfalfa first introduced, 161
for swine, 246
vitamin content of, 401
Anemia in baby pigs, 462
Anesthesia by refrigeration, 286
in man and animals, 169
literature on, 169
wider uses for caudal, 244
Animal exports, 126
health insurance, 366
husbandry in India, 473
husbandry in New Mexico, 67
husbandry in P. R., 376
production goals, 327
Animals, disposal of ailing, 448
effects of air raids on, 48
Animals in transportation, loss of, 444
Animal transportation, 367
Anthelmintic in dogs, $H_2 O_2$, 302
treatment of horses, 8
Anthrax, diagnosis of, 130
epizootics of, 277
in minks, 402
kills 12 animals, 2 men, 321
outbreak in Iowa, 446
treatment of, 236
Antianemia vitamin, 245
Antiseptic, a new, 245
Army meat inspection, 127
personnel, health of, 442
Arteriosclerosis in a horse, 156
Aujeszky's disease, 22
disease in swine, 178
Autobiography of a veterinary practitioner, 29, 74, 109, 150, 190, 229, 267, 312, 348, 392, 432, 480
Autopsies, importance of, 157
A.V.M.A. 80th An. Meeting, 361

B

Bacillus pestus longlived, 402
Bactericidal agents in mastitis, 79
B.A.I. loses meat inspection, 125
Baldness, fake treatments for, 448
Bear, fibroma in a, 488
Benzyl benzoate for mange, 496
Bergman, Dean at Iowa School, 285
Biologics, former use of, 366
Biotin (vitamin H) deficiency, 241
Bipp inhibitory action of, 7
rivival of, 7
Blackleg, diagnosis of, 490
sporadic, 489
Black market, effects of the, 168
Bloat in ruminants, 351
Blood cells, effect of fat on, 445
use of red, 203
Blood characteristics, unique, 311
beef, a substitute for human, 496
plasma a major victory, 201
plasma for burns, 42
samples from swine, 100
serum in shock, beef, 283
transfusion history, 373
Boar, castration of a, 490
Boars, restraint for, 315
Book Reviews
Ambassadors in White, 36
Behind the Sulfa Drugs, 359
Breeding and Improvement of Farm Animals, 37
Brucellosis in Man and Animals, 238
Dictionary of Biochemistry and Related Subjects, 359
Diseases of cattle, 120
Diseases of the Horse, 120
Diseases of Poultry, 319
Doctors Mayo, The, 40
Food Poisoning, 239
Home Veterinarian, The, 239
Infectious Diseases of Domestic Animals, The, 238
Introduction to Parasitology, 80
Manual of Veterinary Bacteriology, 240
Microbiology of Meats, 279
Military Medical Manual, 120
Officer's Guide, The, 39
Pharmacopeia of the U.S.A. (U.S. P. XII), 80
Raising Rabbits, 120
Rabbit-Raising, 280
Springer Spaniel, The, 38
Story of Meat, The, 280
Textbook of Meat Hygiene, 320
Veterinary Surgery Notes, 38
Virus Diseases, 360
William's Surgical Operations, 319
Bot fatalities, 87
infestation in a horse, 12
Bovine TB. eradication, 45
Breeding controlled, artificial, 124
Brucellosis, control, 167, 357
control waning, 367
free dairy herds, 205
in man, 440
of swine, 101, 464
vaccination in Calif., 374
Bull, rectal tumor in, 395
Burns, blood plasma in, 42
death from severe, 375
new treatment for, 375

C

Calcium, utilization of, 321
Calculus in a hog, urinary, 354
Calf, necrotic laryngitis in, 394
diphtheria, 298
scour, transfusion for, 367
Calves and saving milk, raising, 278
blackleg in, 489
value of creep-feeding, 122
Camp Grant, lead line at, 2
Cancer problem, the, 340
vitamin K therapy in, 340
Caribou in Alaska, number of, 281
Carotene and vitamin A, 159
Castration, standing operation for, 113
of colts, 35
Cats, enteric infections in, 202
high price of, 202
submaxiliary abscess in, 199
Cattle, bloat in, 351
Brucella suis in, 101
cesarean section in, 486
chronic mastitis in, 79
control of grubs in, 172
diseases of feet in, 94
effects of mastitis in, 58
elephantiasis in, 198
ergotism in, 435
eversion of uterus in, 91, 275
eye carcinomas in, 35
grazing habits of, 237
hermaphrodism in, 274
influenza in, 94
ingestion of foreign bodies in, 115
insemination of, 379
ketosis in, 93
lancet flukes in, 294
louse control in, 206
lymphocytosis in, 493
mastitis in, 14
midget, 374
milk fever in, 437
mineral deficiency in, 113
necrotic hepatitis in, 297
osteosarcoma in, 232
outbreak of anthrax in, 446
paint-poisoning in, 158
parturient paresis in, 154
population of India, 1
post parturient paresis in, 92
potato meal for, 401
practice, dairy, 91
pregnancy diagnosis in, 411
pyelonephritis in, 397
rectal fistula in, 354
sarcoma in, 199
self-sucking in, 34
T B eradication in, 45
the mastitis problem in, 52
treatment of mastitis in, 122, 160, 174
type and production, 374
vaginal prolapse in, 92
variation of semen in, 78
wheat "poisoning" in, 118
Cause, help the, 3
Cavalry suited to various tasks, 2
Cecal worm, treatment for, 384
Cesarean section in a cow, 486
section in swine, 439
Chemical warfare, defense against, 77
Chemotherapy, questions for, 261
Chickens, histomoniasis in, 148
sulfathiazole for colds in, 26
Chicks, curled-toe paralysis in, 117
require pantothenic acid, 160
Chloral hydrate, intravenously, 33
Chloroform for lungworms, 232
Coccidiosis in a dog, 276
in puppies, 32
ovine, 337
treatment of cecal, 147
Colts, contracted tendons in, 275
castration of, 113
Community sales, infection at, 366
Composition of the human body, 214
Constipation in a bull, 395
Copper deficiency effect on wool, 201
Coprophagy in rabbits, 72
Cows, handling self-sucking in, 34
Craig, death of Professor J. F., 168
Crotalaria poisoning, 255, 257
Crystal-violet H-C vaccine, 357, 415

D

Dairy cows, number of, 374
herd, examination of 56
Derris root in scabies, 7
Desert animal husbandry, 67
Diaminodiphenyl sulphone, 241
Diarrhea, treatment of, 381
Dicrocoelium dendriticum, 294
Discipline, value of, 44
Disease control, fundamentals of, 67
Disinfectants, action of, 203
Distemper, canine, 466

Dog and man long associated, 47
Dog, cesarean section in, 103
food council, 285
food committee blunders, 47
food restricted use of, 84
generalized tic in, 233
owners in Britain, 166
papilloma tosis in, 200
poisoned by salt pork, 353
rupture of tendon of Achilles in, 72
sarcoptic mange in, 496
sulfanilamide therapy in a, 276
tuberculosis in, 234
Dogs, avitominotic, 440
by Japan, use of war, 85
coccidiosis in, 32
destructiveness of stray, 205
distemper in, 466
eczema in, 494
enteric infections in, 202
for defense, 85
for war in Britain, 202
H_2O_2 anthelmintic in, 302
housedog disease in, 419
inguinal hernia in, 492
in wartime, feeding, 208
in war, use of, 85
leptospirosis in, 221, 224, 355
ophthalmia in, 495
oral lesions in, 440
prevention of shock in, 440
riboflavin deficiency in, 495
Seeing-eye, meat for, 244
thiamin deficiency in, 262
Dourine spreading in U.S., 367
Dysentery in swine, 464

E

Ear markings for pigs, 226
Eastern Iowa Vet'y Ass'n, 446
Eczema in dogs, 494
Eggs, dehydrated for Army, 245
deterioration in, 281
fertility of, 122
for swine, incubated, 116
in chick rations, infertile, 403
Eichhorn, retires from B.A.I., 285
Elephantiasis in heifer, 198
Encephalomyelitis and hog cholera, 22
in Iowa, 446
in 1942, 163
research, 83
vaccine against, 365
Enteric diseases of swine, 59
Enteritis in the dog and cat, 202
of swine, infectious, 205
Erysipelas in swine, 447, 463
Erysipeloid in veterinarians, 399
Erysipelothrix in chickens, 419
Estrum in pregnant cow, 274
Examination of thoroughbreds, 404
Experiences of a practitioner, 233
record your, 35
Eversion of the uterus in cows, 91, 275

F

Farmer vaccination disastrous, 5
Federal veterinarians' association, 204
Feed, folly of using poor, 362
supply and animal production, 287
Feeds, fluorine in, 364
for animals, insufficient, 327
limit on protein, 173
study of protein in, 370
utilization of, 370
variation in quality of, 201
Fertility and hatchability, 122
Fibroma in a bear, 488
Fibrosarcoma in a cow, 199
Fish juice for liquids, 370
Fluid balance mechanism, 305
Flukes in cattle, lancet, 294
Fluorine on lambs, effect of, 77
Foals, contracted tendons in, 70
Folic acid, a use for, 244
Food habits of ancients, 126
research, council for, 244
Foods for dogs, wartime, 208
Foodstuffs to Allied Nations, 45
Food supply safe, Army, 365
Foot-and-mouth disease, 402
eradication, 321
in Europe, 161
serum for, 321
Foramen ovale, persistent, 491
Fowl cholera, 430
Fur industry feed shortage, 84

G

Gasterophilus infestation, 12
species, 87
Gastritis, traumatic, 486
Glottidium poisoning, 478
Goats, effect of phenothiazine on, 96
facts regarding, 476
Johne's disease in, 258
made to lactate, virgin, 81
pasteurellosis in, 299
phenothiazine in, 63
Gramicidels and tyrothricin, 277
Grazing habits of cattle, 237
Grub, cost of the cattle, 172

H

Habronemiasis, cutaneous, 316
Hay, legume and grass, 375
Hemorrhagic septicemia, 215
Hepatitis in cattle, necrotic, 297
Hermaphrodite, canine, 435
Hemorrhage, cutaneous, 487
Hernia in a bitch, inguinal, 492
Heterakis, gallinae, treatment for, 384
Histomoniasis in broilers, 148
Hog cholera and encephalomyelitis, 22
crystal violet vaccine in, 415
losses from, 168
serum production, 373
vaccine, 357
Holland's cattle expropriated, 242
Housedog disease, 419
Horse, bot infestation in, 12
developed in America, 410
facts and figures, 329
thrombosis in a, 156
vaginal abscess in, 35
Horses and mules, number of, 281
a new hay for, 375
anthelmintic treatment of, 8
Britain's police, 5
castration accidents in, 35
decrease in war lands, 323
encephalomyelitis in, 163, 446
examination of race, 404
more power from, 410
multiple abscesses in, 488
parasites of, 88
price of work, 5
puncture wounds in, 492
purpura hemorrhagica in, 485
scabies in, 7
strangles control in, 356
strongylosis in, 8
unusual parasitism of, 490
use of chloral hydrate in, 33
Hydrogen peroxide in dogs, 302
Hypo-pituitarism in sows, 371

I

Ictero-anemia in swine, 271
Incubator, bacteriological, 19, 283
India, animal husbandry in, 473
veterinary service in, 475
Infectious anemia increasing, 366
Influenza, role of swine lungworm in, 206
Insects, annoyance of tropical, 284
new weapon against, 284
Insemination, artificial, 333
and disease, 379
Inspectors, meat and food, 82

J

Johne's disease of goats, 258

K

Kelser, accomplishments of Gen., 83
Kirk Surgeon General of Army, 205

L

Laboratory at M. S. C., 4
Lamb crop in 1943, size of, 441
Lambs, effect of fluorine on, 77
Laryngitis in a calf, 394
Landsteiner, achievement of, 402
Lead line at Camp Grant, 2
Legislators, wise and foolish, 5
Leininger retires, Col., 322
Lend-lease food distribution, 201
Leptospirosis, diagnosis of, 355
in man and animals, 221
in Washington, D. C., 321
Livers, condemnation of beef, 445
Livestock largest source of income, 402
maladies, 82
numbers decline, 241
nutrition, practical of, 343
nutrition, 251, 289, 384
production essential, 363
production increasing, 165
Locoweed poisoning, 257
Lungworms, chloroform for, 232
phenothiazine for, 63
Lymphangitis in a mare, 488
Lymphocytosis in a cow, 493

M

Man and dog long associated, 47
Mange, sarcoptic in dog, 496
Mash for trichomoniasis, fermented, 385
Mastitis and milk deficiencies, 58
bovine, 14
by infusion, treatment of, 122
control in Delaware, 442
importance of, 368
problem, the bovine, 52
treatment of, 79, 447
treatment of chronic, 160
tyrothricin for, 174
Meat and dairy hygiene, class in, 129
and food inspectors, 82
and war, 82
consumption increasing, 445
federally inspected, more, 46
inspection for the army, 127
inspection needed, state, 362
inspection out of B. A. I., 125
rationing, 370
substitute, soybeans a, 375
waste in marketing, 328
Meats highly nutritious, 403
Mildew poisoning, 487
Milk deficiency and mastitis, 58
detection of bloody, 118
fever, observations on, 154
for Boston, certified, 441
for New York, certified, 374
powder, preservation of, 441
Milkweed poisoning in turkeys, 159
Miller, new chief of B. A. I., 324
Mohler, a tribute to Dr., 448
retires, Dr. John R., 204
retirement announced, 324
M. S. C. pathological laboratory, 4

Mule, cutaneous hemorrhage in, 487
habronemiasis in a, 316
rupture of tendons in a, 318
Mules and horses, numbers of, 281

N

Nagana spread by big game, 167
Nails ingested by chicks, 436
Necropsies, importance of, 157
Nerve grafts from cadavers, 441
preservation of, 245
Nitrogen equilibrium, 328
Nodular worms, control of, 99
Nutrition and reproductive failure, 78
practical livestock and poultry, 251, 289, 343, 384
Nylon filaments for sutures, 281

O

Ophthalmia in dogs, 495
Osteosarcoma in a steer, 232
Ostriches, diseases of, 278

P

Packing industry aids defense, 41
Paint-poisoning in a calf, 158
Pantothenic acid and chicks, 160
Papillomatosis, buccal, 200
Parasite control in sheep, 355, 447
eggs, viability of, 77
in spermatic sheath, 352
Parasitic diseases of turkeys, 167
Parasites and sutures, 99
Parasites, incidence of horse, 88
losses due to, 369
of horses, worm, 88
of swine, internal, 462
phenothiazine for, 447
tolerance to, 281
unusual location of, 490
Parturient paresis, 154, 437
post, 92
Pasteurellosis of sheep and goats, 299
Peanuts for hog fattening, 5
Pearl Harbor, Amer. Victory at, 301
Penicillin, clinical report on, 443
destroys stroptococci, 401
history of, 249
Pentothal sodium anesthesia, 169
Pet food order revised, 286
Pharmacy Corps, Army, 322
Phenothiazine, administration of, 215
effect on goats, 96
dosing with, 447
for cattle lice, 206
for parasites, 384
in sheep practice, 215
Pig anemia, 462
crop 74 million, 323
crop, size of the, 460
Pigs, loss of baby, 367
saved saves feed, 372
scour in, 462
Plagues, animal, 82
Plague (bubonic) in Washington, 201
Plagues, danger from animal, 366
under control, seven, 442
Plant poisoning, 478
of livestock, 255
Poisoning crotalaria, 255, 257
ergot, 435
Glottidium vesicarium, 478
locoweed, 257
mildew, 487
milkweed, 159
paint, 158
salt pork, 353
selenium, 257
solanine, 353
Post-mortem examinations, 157
Poultry, cecal worms in, 384
control of pox in, 164
green feeds for, 292
histomiasis in, 148
losses, causes of, 446
nails swallowed by, 436
national council on, 164
nutrition, practical, 251, 289, 343, 384
perpetuates tuberculosis, 149
pneumo-encephalitis in, 46
poisoned by crotalaria, 257
practice, extent of, 180
production increasing, 165
products, loss of, 368
slaughter, by-products of, 116
sulfathiazole for colds in, 26
swine erysipelas in, 430
Practice, a day in, 316
suggestions, 233
West Virginia, 316
Pregnancy, diagnosis of, 411
test, a new, 243
Production quotas for 1943, 207
Propamidine wound antiseptic, 245
Protein concentrates from grass, 441
feed requirements, 207
feeds, limitations of, 173
from corn germ, 443
needs of turkeys, 470
precipitant, 401
Proteins, varying values of, 241
Pseudorabies in swine, 178
Pullorum disease reduced, 402
Pullorum disease testing, 281
Purpura hemorrhagica, 485
Pyelonephitis in a cow, 397

Q

Quinine, three tons of it, 322

R

Rabbit ailments, 398
Rabbit-breeders' opportunity, 265
Rabbit equals muskrat, marsh, 1
Rabbitries, problems of, 187
Rabbits and food production, 107
castration of, 437
coprophagy in, 72
diseases of, 187
gastritis in, 398
hem, sep. in, 315
impotence in, 266
sexing young, 265
Races, best American horse, 406
Recto-vaginal fistula, 352
Reproduction, effect of nutrition on, 78
Riboflavin, influence on growth, 117
deficiency in dogs, 495
Rinderpest in India, 475
vaccine against, 83

S

Saboteur, stamp out this, 3
Scabies, derris root in, 7
Scour in pigs, 462
Scrap (iron), need for, 202
Screwworm fly, prevalence of, 442
Seeing-eye dogs, meat for, 244
Selenium poisoning, 257
Self-sucking in cows, 34
Semen sales controlled, 124
variation in quality of, 78
albumen production, 243
Sex, predetermination of, 371
Shark carcass has many uses, 1
Sheep and internal parasites, 355
an improved breed of, 445
coccidiosis treatment in, 337
mildew poisoning in, 487
nodular worms in, 99
pasteurellosis in, 299
phenothiazine for, 63
Sheepskin production increasing, 445
Sheep production in 1943, 369
pulmonary abscess in, 395
treatment of coccidiosis in, 144
treatment of parasites in, 447
use of phenothiazine in, 215
Shipping fever in cattle, 94
Shock, beef blood serum in, 283
effect of temperature on, 403
fluid balance in, 305
prevention of, 440
serum and plasma in, 399
vitamin C for, 123
Slaughterers licensed, 167
Slaughter, uninspected, 124
Sodium salts of sulfonamides, 236
Solanine Poisoning, 353
Southdale, a new breed of sheep, 445
Soybean feed for swine, 205
S.P.C.A. 75 years of age, 166
Statistics, Baker's, 195
Statistician, the irrepressible, 214
Strangles, vaccination against, 356
Stomatitis, sulfathiazole for, 441
Strongylosis of horses, 88
Sulfa drug film, 45
Sulfa drugs in osteomyelitis, 161
intraperitoneally, 400
not for first-aid, 375
use of, 446
Sulfaguanidine for coccidiosis, 81, 144, 147, 387
Sulfanilamide, local use of, 81, 203
Sulfasuxidine in coccidiosis, 337
in wounds, 446
Sulfathiazole for colds in chickens, 26
for trench mouth, 441
local use of, 355
Sulfonamides and wounds, 236
and surgery, 237
salts of, 236
Surgery and sulfonamides, 237
Surra, vectors of, 84
in camels, 475
Swine, Aujeszky's disease in, 178
avian TB, in, 446
blood samples from, 100
brucellosis, 464
cesarean section in, 439
cholera in, 463
cholera losses in, 168
dysentery, 447
ear markings for, 226
eggs as food for, 116
enteric diseases of, 59
enteritis, 447, 463
erysipelas, 102, 293, 447, 463
fattened on peanuts, 5
feeding in wartime, 377
hemorrhagic dysenry in, 464
hypo-pituitarism in, 371
ictero-anemia in, 271
infectious enteritis of, 205
lungworm and influenza, 206
market weight of, 445
menaces to, 367
need vitamin B_6, 122
parasites, 462
poisoned by buffalo bur, 353
pox in young pigs, 462
pox spread by lice, 122
practice, problems in, 460
problems in feeding, 461
restraint in, 315, 490
soybean feed for, 205
spread of disease in, 465
urinary calculi in, 354
vaccination requirements, 205
vesicular stomatitis in, 403
white scour in, 228

T

Tasmania, veterinary service in, 115
Tenderay processing of meat, 41
Tendon of Achilles, rupture of, 72
rupture of prepubian, 318
Tendons, congenital contraction of, 275

in foals, contracted, 70
Thiamin deficiency in dogs, 262
Thorn-headed worm, eggs of, 77
Thrombosis in a horse, 156
Tic in a dog, 233
Transportation, loss of animals in, 444
Trichinae, thermal death point of, 442
Trichinosis, facts concerning, 140
Trichomoniasis in turkeys, 119, 385
Trichophytosis introduction of, 241
Trypanosomes, treatment for, 81
Tumor in a bull, rectal, 395
Tumors due to viruses, 243
Tuberculosis in a dog, 234
in England, bovine, 201
perpetuated by poultry, 149
Turkeys, feeding, 470
parasites of, 167
poisoned by milkweed, 159
pullorum disease in, 281
trichomoniasis in, 119, 385
Tympanites, acute, 351
Typhus fever in Texas, 201
virus found in mice, 244
Tyrothricin, 277
in mastitis, 174
in mastoid operation, 1

U

Uninspected slaughter, 124
Uterus, eversion of the, 91, 275

V

Veterinarian, an appreciation of, 448
autobiography of, 29, 74, 109, 150, 190, 229, 267, 312, 348, 392, 432, 480
Veterinarians, commissioning of, 6
duties of, 1
erysipeloid in, 399
in Britain, 161
needed, 369
needed in N. Z., 246
senior, 326
to be commissioned, 42
trustworthy, 326
Veterinary corps, achievements of, 83
education, British, 126
experiences, 233
history straight, keep, 246
hospital in Syria, 213
legislation in Britain, 283
literature, ancient, 41
medicine, the science and art of, 44
officer a pilot, 6
officers' class, 43, 129
officers commissioned, 162
officer's experiment conserves fats, 242
practitioner, autobiography of, 29, 74, 109, 150, 190, 229, 267, 312, 348, 392, 432, 480
progress and war, 2
service in India, 475
service in Tasmania, 115
service for poultry, 180
students enlist in army, 242
technicians, school for, 6
technicians' training, 42
vital statistics, 284
Vitallium tubes for blood vessels, 400
Vitamin A inactivated by meat, 270
A stable in eggs, 270
B, deficiency in dogs, 262
B, destroyed by raw fish, 270
B_6 essential to swine, 122
C in the war, 123
C retained in milk, 402
isolated, antianemia, 245
needs of turkeys, 470
Vitamins fabricated by plants, 270
germination increases, 372
the A B C of, 171
varying amounts of, 372

W

War and influenza, 121
and veterinary progress, 2
demands for food, 41
emergency and meat, 82
expenditures for research, 245
expenditures, rate of, 282
industry, agriculture biggest, 282
manpower announcement, 323
rations for turkeys, 472
wounded, care of, 322
Warble fly, eradication of, 172
Wars, the first year in two, 282
Wartime swine feeding, 377
Washington, Gen. George, 44
Weil's disease, 223
Wheat "poisoning" in cattle, 118
White scour in pigs, 228
Wooldridge retires, Prof., 372
Wound in the thigh, puncture, 492
treatment, 449
Wounds and sulfonamides, 236
at Pearl Harbor, 124, 301
heal, how, 449
management of, 449
sulfathiazole for, 355

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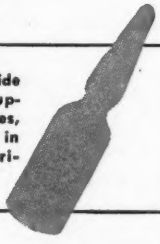

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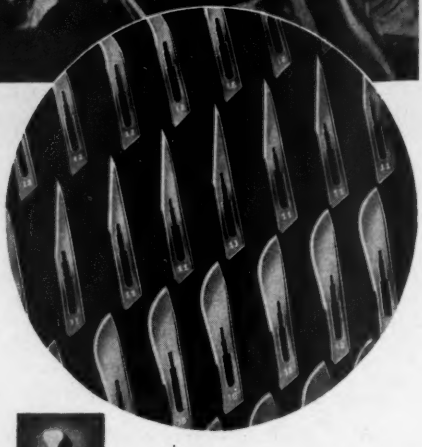

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A compilation of important information for veterinarians in civilian practice, in the military service and in official disease control work, taken largely from recent articles in VETERINARY MEDICINE.

The possibility of the spread of foreign animal plagues among our livestock by enemy agents is generally recognized. The necessity for the prompt recognition of such epizootics by veterinary practitioners can hardly be over emphasized, nor is it less essential that livestock sanitary officials be prepared to direct measures for the immediate suppression of these or other outbreaks of disease among animals. Control of animal plagues is as important at this time as food; therefore a knowledge of the foreign animal plagues of note and of others capable of disastrous effects because of the depletion of the veterinary service to the livestock industry that war entails, is essential.

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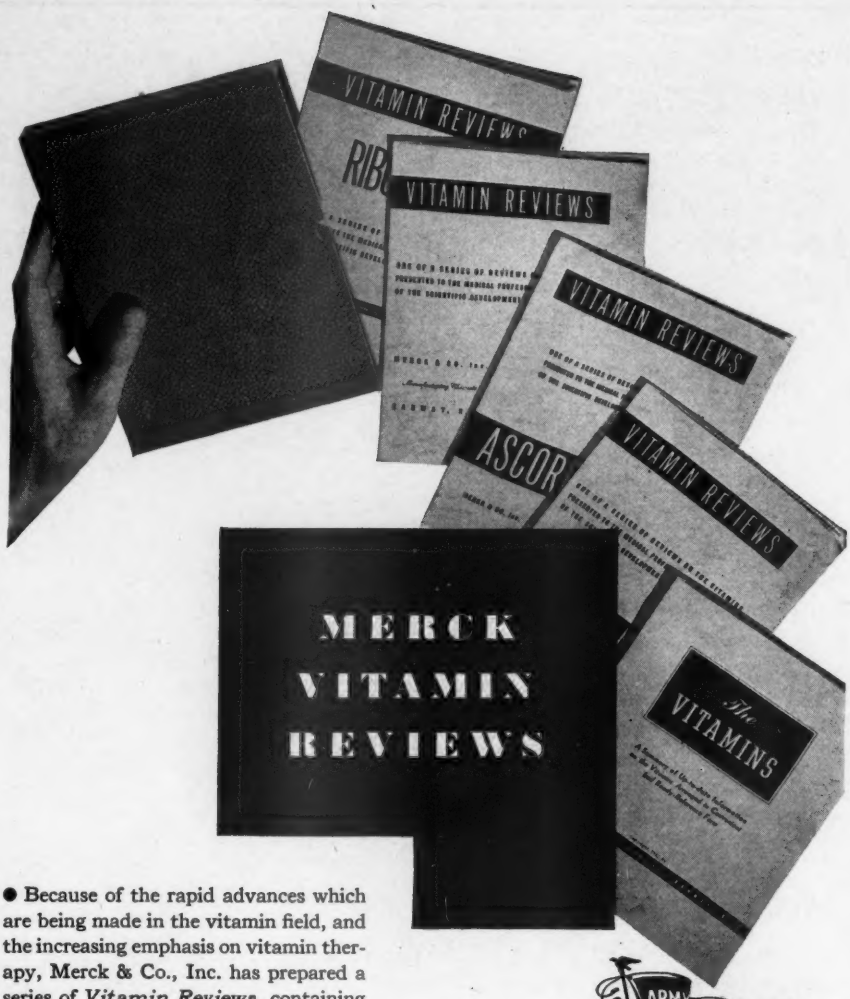

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SQUIBB —— A NAME YOU CAN TRUST

Tuberculosis in Wartime*

IN TIME of war—beware of tuberculosis. For war and tuberculosis go together. In World War I this disease gained headway among all the peoples involved.

Up to the present the tuberculosis record in the United States is reassuring but it is not unlikely that the disease will again make headway. In England the early war years showed an increase of 10% in deaths from tuberculosis.

During 1942 there was a noteworthy rise in the disease among young people—young men of 15 to 24 years and young girls of 10 to 14. Every young person going to work for the first time should have his or her lungs X-rayed. This is of great value when it is a part of a complete medical examination. Of equal importance are the living habits, good and adequate food, also sufficient rest.

There is nothing "faddish" or "sissy" in knowing the kind and amount of food needed and in eating them for eating is not a matter of appeasing hunger. Adequate rest is of equal importance. Recreation and entertainment are desirable but not at the cost of sleep.

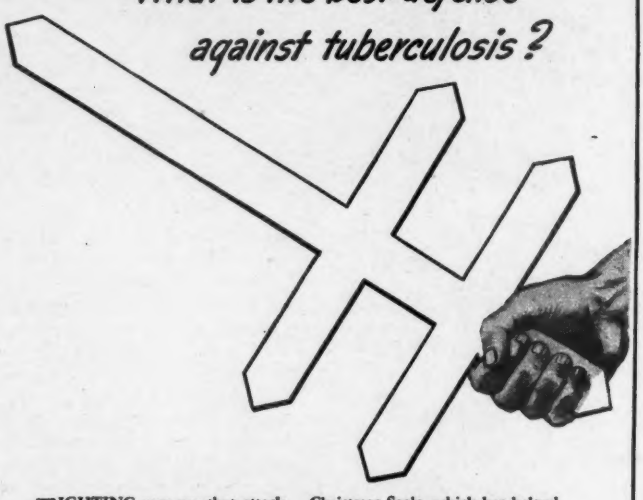
Every one should know the signs and symptoms of tuberculosis: loss of weight, a cold that hangs on, a tiredness that can't be gotten rid of, fever, spitting blood.

We cannot afford to gamble with or to waste any of our manpower. It is our individual responsibility to see that none of it is wasted.

Your local tuberculosis association is ready and eager to help you with literature, posters, information and advice. Your support of the annual Christmas Seal has made these services possible. Make them your weapons for health and victory.

*By *Iago Galdston*, Executive Secretary of Medical Information Bureau, New York Academy of Medicine; author of Behind the Sulfa Drugs, etc.

What is the best defense against tuberculosis?



FIGHTING men say that attack is the best defense. And this holds true in the battle against our greatest unseen enemy—*the dread tuberculosis that still kills more people between the ages of 15 and 45 than any other disease.*

TB is no respecter of persons or homes—over night it may strike you, your family. One strong safeguard is your annual purchase of Christmas Seals, which has helped a gallant army of volunteer laymen and doctors cut the TB death rate by *seventy-five per cent* since 1904.

Your help is needed now to prevent a wartime rise in tuberculosis. To protect your home . . . and every home in America . . . send in your contribution, *today, please!*

BUY CHRISTMAS SEALS

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● The simple addition of water returns Pard Dehydrated to its original "fresh food" goodness. Thus, *it's the same fine Pard* . . . appetizing and palatable as ever! That's because Pard Dehydration is the latest and finest of scientific methods . . . an exclusive Swift process that removes *only* moisture. The flavor and nourishment of Pard's fine ingredients are fully protected!

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We're Helping, Too

We are proud to say that we are helping, too. Our special training is in the field of feeding, management and sanitation. In our "Food for Victory Crusade" we're going right out on farms to help livestock and poultry raisers locate and correct poor feeding, management and sanitation practices. We expect to make *half a million* calls in the next few months.

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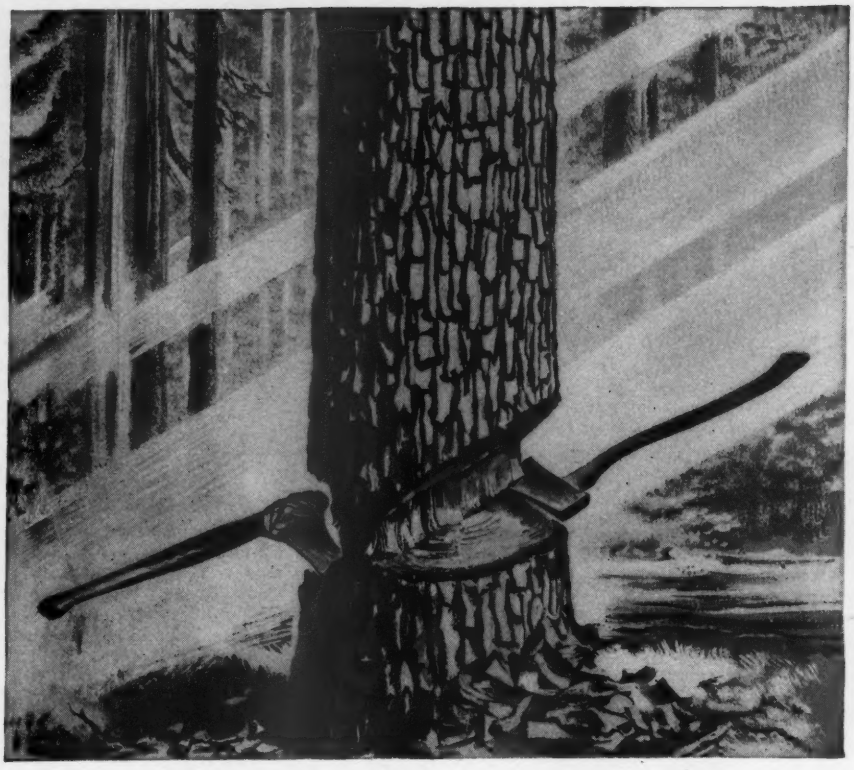

THE DIFFERENCE IS OBVIOUS

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WHAT THE

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MEANS TO MANKIND

Back of the Christmas Seal

● The campaign for the control of tuberculosis, as exemplified by the well-known Christmas seal, owes much of its success to the veterinary profession. Not only did veterinarians give the original impetus to organized world-wide tuberculosis control, but they have pioneered many advances in the scientific attack on the disease, including the eradication of bovine tuberculosis.

In Paris in the year 1888, at the suggestion of a veterinarian, Butel, the first International Congress on Tuberculosis, attended alike by physicians and veterinarians, was held. The fact that another veterinarian, Chauveau, was chosen to preside at that meeting further indicates the importance of veterinarians to this campaign.

The practical contributions which veterinarians have made to tuberculosis control are indicated by this statement, made in 1940 by J. Arthur Myers, a physician: "In human tuberculosis, many problems which are today considered controversial have already been solved by the veterinary profession."

One of a series of advertisements on behalf of the Veterinary Profession published by

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Among four Dayton, Ohio, Masons nominated to receive the 33rd degree in that Order, was Harry T. Moss, well known veterinarian. Doctor Moss is also secretary of the Kiwanis Club in his city.

■

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We need more copies of the January and the August issues (1943) of VETERINARY MEDICINE.

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Every rat eats $2.00 worth of food a year, which means an annual board bill—in this country alone—of more than 260 million dollars. But worse than this huge figure, rats destroy 10 times as much as they eat; in total destruction they cost the United States well over 2 billion dollars annually. However, this tremendous loss caused by rats assumes insignificance when it is considered that rats are carriers of the dread plague and typhus fever which are transmissable to man.**

** *Hygeia*, 21:1, p. 18.

From experiments conducted at the Massachusetts State College and Agricultural Station at Amherst, it has been found that the fresh tomatoes on the market in late winter and early spring have a vitamin C content of only about one-third that of summer tomatoes.

★ ★ ★ BUY WAR ★ ★ ★
STAMPS AND BONDS

Dr. Charles F. McKhann, former Professor of Pediatrics and Communicable Diseases, University of Michigan, has become affiliated with Parke, Davis and Company as Assistant to the President, devoting his efforts entirely to the scientific activities of the company.

Previous to his connection with the University of Michigan, Doctor McKhann was consultant to the Board of Health, Territory of Hawaii. Later he was Associate Professor of Pediatrics and Communicable Diseases at Harvard Medical School and Harvard School of Public Health. Earlier he was Visiting Professor of Pediatrics and Communicable Diseases at Peiping Union Medical College, Peiping, China. For many years the doctor has conducted and directed research on communicable diseases, immunology, renal and nutritional diseases. He developed and introduced immune globulin.

EVERYBODY'S FARM HOUR AT WLW

A general discussion concerning animal and poultry health between Charles W. Bower, president of the A.V.M.A., speaker and other veterinarians—guests at a "Keep 'em Healthy" broadcast—preceding one of the series of animal health programs sponsored by WLW in cooperation with the Veterinary Medical Associations of Indiana, Ohio and Kentucky. Left to right are Roy Battles, associate farm program director of the station; Drs. H. J. Wright and C. H. Slater, Hamilton, O.; J. A. Winkler (Assistant State Veterinarian and Chairman of the executive committee of the Kentucky Association), Newport, Ky.; S. W. Stout (President of the Tri-County Veterinary Medical Association), Hamilton, O.; R. G. Kerans (President of the Southwestern Ohio Veterinary Medical Association), Norwood, O.; A. G. Madden, Madeira, O.; N. H. Myers (Secretary of the Southwestern Ohio Veterinary Medical Association and Director of the State Association), Wilmington, O.; and Ed. Mason, WLW Farm Program Director

EXPOSED TO HOG CHOLERA

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No post-vaccination reactions ... no loss of condition or life due to vaccination.

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FINE VETERINARY PHARMACEUTICALS at lower cash prices. Write for price. Salesmen and jobbers solicited. VETERINARY PRODUCTS CO., New Castle, Indiana.

WANTED: Copies of the August, 1943, issue of VETERINARY MEDICINE. Subscriptions will be extended one month for each copy returned.

FOR SALE OR RENT: Scanlan Veterinary hospital; established 20 years. Sickness and old age reason for selling. Dr. G. C. Meskimen, owner, 3631 Elston Ave., Chicago 18, Illinois.

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WANTED: Experienced army exempt man; as assistant in small animal hospital. Quote references and all information in first letter. Address No. 412, care of VETERINARY MEDICINE.

WANTED: Veterinarian, draft exempt; to assist in small animal practice with opportunity, if competent, of taking over management. State experience and full particulars, with photo, in first letter. Misener Animal Hospital, 6448 N. Clark St., Chicago, Illinois.

KNOW YOUR BREEDS: Keep up-to-the-minute on all breeding, shows and happenings in the professional field —subscribe to Dog World, $2 for one year, $3 for two years, $5 for five years. Judy Publishing Co., 3323 S. Michigan Ave., Chicago 16, Illinois.

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WANTED AT ONCE: A white veterinarian, also a white kennel man; gentiles. Good starting salaries with room or rooms furnished. These are permanent positions in Baltimore, Md. In answering, state age, experience and if handicapped in any way. All replies to following box number will be held strictly confidential. Address No. 410, care of VETERINARY MEDICINE.

"HORSESHOES OF INTEREST TO VETERINARIANS" by the late Prof. Henry Asmus, Cornell University. This new book on horseshoeing contains 164 illustrations of shoes for both healthy and defective hoofs and for several kinds of lameness, with full description of each. Price $1.00. Address Mrs. Henry Asmus, 7 Reservoir Ave., Ithaca, N. Y.

■

There Shouldn't Be Any Maggots

G. P. Reed, state food and drug inspector of Texas, in telling of some of the unwholesome food conditions against which his department is constantly on guard, described the case of a dairyman who was rebuked for bringing maggot-infested milk to market. "Why, there shouldn't be any in it for I strained them all out," insisted the farmer.—*National Provisioner.*

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Double Strength
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McKeon's "Sulpho Dip"

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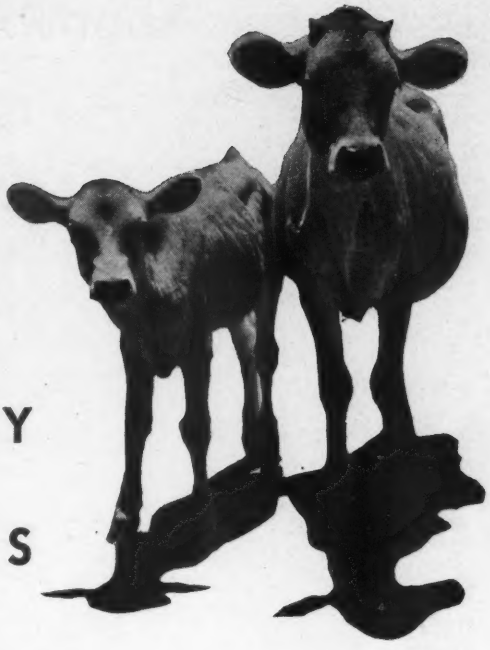

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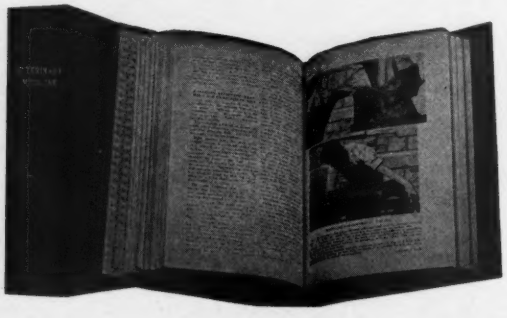

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December 1. Sec. A. D. Weber, Kansas State College, Manhattan, Kans.

Horse and Mule Association of America, 24th Annual, Chicago, Ill.; Dec. 1. Sec. Wayne Dinsmore, 407 S. Dearborn St., Chicago 5.

United States Live Stock Sanitary Association, La Salle Hotel, Chicago; Dec. 1-3. Sec. R. A. Hendershott, New Jersey Bureau of Animal Industry, Trenton.

Arizona Veterinary Medical Association, annual meeting, Westward Ho, Phoenix; Dec. 7. Sec. Vego Mikkelson, Phoenix.

Kansas Veterinary Medical Association, Hotel Allis, Wichita; Dec. 29-30. Sec. C. W. Bower, 3119 Stafford, Topeka.

Ohio State Veterinary Medical Association, Deshler-Wallick Hotel, Columbus; Jan. 5-6, 1944. Sec. R. E. Rebrassier, Ohio State University, Columbus.

Cornell University 36th Annual Conference for Veterinarians, New York State Veterinary College, Ithaca; Jan. 5-7. W. A. Hagan, Dean, Ithaca.

Oklahoma Veterinary Medical Association, Oklahoma City; January 10-11. Sec. F. Y. S. Moore McAlester.

Minnesota State Veterinary Medical Association, Hotel Nicollet, Minneapolis; Jan. 10-12. Sec. H. C. H. Kernkamp, University Farm, St. Paul 8.

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Illinois State Veterinary Medical Association, 62nd annual meeting, Leland Hotel, Springfield; Jan. 20-21. Sec. C. C. Hastings, Williamsville.

Iowa Veterinary Medical Association, Hotel Fort Des Moines, Des Moines; Jan. 25-27. C. C. Franks, 855 31st St., Des Moines.

New Jersey Veterinary Medical Association, Hotel Sheraton, Newark; Feb. 3-4. Sec. J. R. Porteus, Box 398, Trenton.

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W. C. Robinson, Newcomerstown, Ohio, Ohio State University '11; May 24.

James H. McCart, Ewing, Neb., Kansas City Veterinary College '11; May 29.

Charles E. Steele, 70, Oklahoma City, Okla., Kansas City Veterinary College 1899; served with the American Forces in the Spanish-American War and the first World War and with the British Forces in the Boer War; July 14.

George E. Thomas, 62, Billings, Mont., Chicago Veterinary College '05; in addition to his practice served as city meat inspector for a number of years; August 10.

James L. Lindsay, 67, Jersey City, N. J., American Veterinary College 1895; August 12.

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R. G. Elliott, 37, Aberdeen, S. D., Ontario Veterinary College '32; August 18.

Joseph W. Bryans, 64, Los Angeles, Cal., Ontario Veterinary College '07; August 23.

F. W. Thacker, Carlsbad, N. Mex., Akransas Veterinary College '17; had also practiced in Colorado City, Texas; August 23.

C. O. Young, Piqua, Ohio, Ontario Veterinary College '08; September 7.

Frank E. Walsh, Ames, Iowa, Iowa State College '18; Professor of Veterinary Obstetrics and Head of Department, Division of Veterinary Medicine, Iowa State College; October 7.

A. D. Glover, 77, Newark, Mo., Kansas City Veterinary College '11; entered practice at LaBelle, Mo., and has practiced there since. A son, Lieut. A. D. Glover, Jr., in the Veterinary Corps, is in foreign service. In addition to an extensive practice Doctor Glover operated a large farm and took an active part in veterinary affairs of the state; October 8.

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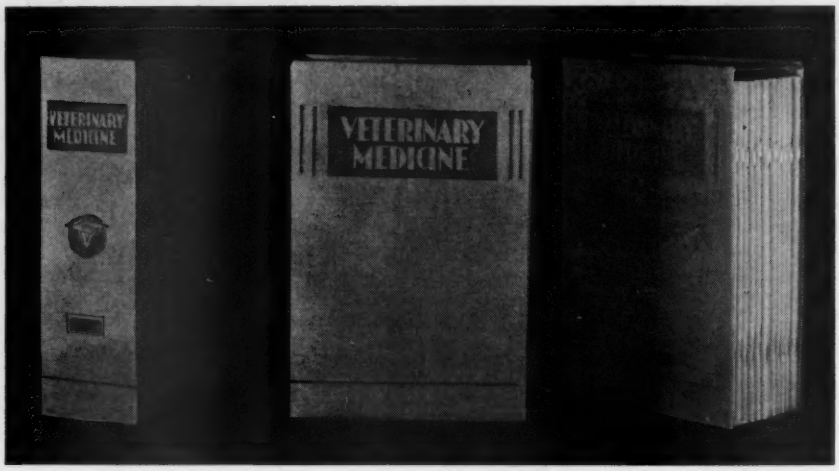

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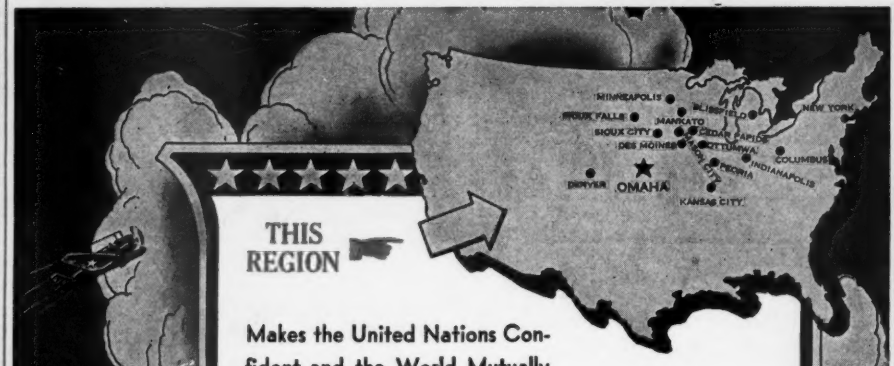

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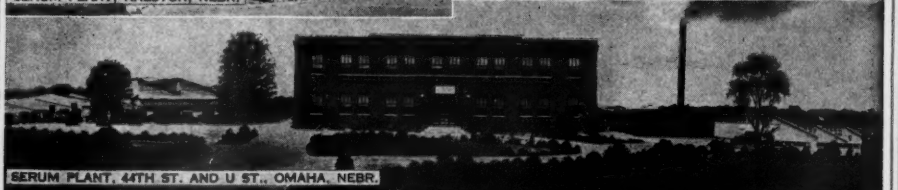

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